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THEORY AND PRACTICE

OF

SEAMANSHIP;

TOGETHER WITH

A SYSTEM OF NAVAL TACTICS:

WITH THE

RULES, REGULATIONS, AND INSTRUCTIONS,

FOR THE

NAVAL SERVICE.

CONTAINING

DIAGRAMS AND ENGRAVINGS.

THE WHOLE FORMING

A USEFUL COMPENDIUM TO THE OFFICER, TO INSTRUCT HIM WHEN YOUNG, AND TO REMIND HIM WHEN OLD.

[SECOND EDITION.]

COMPILED

BY EDMUND M. BLUNT,

AUTHOR OF THE "AMERICAN COAST PILOT," &c. &c.

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BE IT REMEMBERED, That on the twenty-seventh day of July, in the forty-ninth year of the Independenec of the United States of America, Edmund M. Blunt, of the said District, hath deposited in this office the title of a book, the right whereof he claims proprietor, in the words following, to wit:—

"Theory and Practice of Seamanship; together with a System of Naval Tactics: with the Rules, Rngulations, and Instructions, for the Naval Service. Containing Diagrams and Engravings The whole forming a useful Compendium for the Officer, to instruct him when young, and to remind him when old. [Second Edition.] Compiled by Edmund M. Blunt, author of the "American Coast Pilot," &c. &c."

In conformity to the Act of the Congress of the United States, entitled, "An Act for the encouragement of Learning, by securing the copies of Maps, Charts, and Books, to the authors and proprietors of such copies, during the times therein mentioned." And also to an Act entitled, "An Act supplementary to an Act entitled, an Act for the encouragement of Learning, by securing the copies of Maps, Charts, and Books, to the authors and proprietors of such copies, during the times therein mentioned, and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

JAMES DILL,
Clerk of the Southern District of New-York

PREFACE.

In the following pages will be found much information for the Mariner employed in the merchant service, with all that could be collected from the latest and most scientific works on the subject of Naval Tactics; and the Navy Officer will meet with much knowledge compressed in a small compass.

After much expense and care bestowed upon this publication, it is presented to the mercantile community with the hope that it will be useful, and that even the most experienced can derive instruction from its perusal.

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PART I.

EXPLANATION

OF THE

TERMS USED IN SEAMANSHIP.

ABACK. The situation of the sails, when their surfaces are pressed aft against the mast by the force of the wind.

ABAFT. The hinder part of a ship, or towards the stern. It also signifies *farther aft* or *nearer to the stern;* as, the barricade stands ABAFT the main-mast; that is, nearer to the stern.

ABAFT THE BEAM denotes the relative situation of any object with the ship, when the object is placed in any part of that arch of the horizon, which is contained between a line at right angles with the keel and that point of the compass which is directly opposite to the ship's course. See BEARING.

ABOARD. The inside of a ship.

ABOARD MAIN TACK! The order to draw the lower corner of the mainsail down to the chestree.

ABOUT. The situation of a ship as soon as she has tacked or changed her course.

ABOUT SHIP! The order to the ship's crew to prepare for tacking.

ABREAST. The situation of two or more ships lying with their sides parallel, and their heads equally advanced; in which case, they are abreast of each other, as are the ships A B C. But, if their sides be not parallel, then that ship, which is in a line with the beam of the other, is said to be abreast of her, as the ship E is abreast of D and F. With regard to objects within the ship, it implies on a line parallel with the beam, or at right angles with the ship's length.— ABREAST OF ANY PLACE means off or directly opposite to it.

ADRIFT. The state of a ship broken from her moorings, and driving about without control.

AFLOAT. Buoyed up by the water from the ground.

AFORE. All that part of a ship which lies forward, or near the stem. It also signifies *farther forward;* as the manger stands AFORE the fore-mast; that is, nearer to the stem.

AFT. Behind, or near the stern of the ship.

AFTER. A phrase applied to any object in the hinder part of the ship, as the after-hatchway, the after-sails, &c.

A-GROUND. The situation of a ship when her bottom or any part of it rests on the ground.

A-HEAD. Any thing, which is situated on that point of the compass to which a ship's stem is directed, is said to be a-head of her. See BEARING.

A-HULL. The situation of a ship, when all her sails are furled and her helm is lashed to the lee side; by which she lies nearly with her side to the wind and sea, her head being somewhat inclined to the direction of the wind.

A-LEE. The position of the helm when it is pushed down to the lee-side.

ALL IN THE WIND. The state of a ship's sails, when they are parallel to the direction of the wind, so as to shake or shiver.

ALL HANDS HOAY! The call by which all the ship's company are summoned upon deck.

ALOFT. Up in the tops, at the mast-heads, or any where about the higher rigging.

ALONG-SIDE. Side-by-side, or joined to a ship, wharf, &c.

ALONG-SHORE. Along the coast; a course which is in sight of the shore, and nearly parallel to it.

AMAIN. At once, suddenly: as, LET GO AMAIN!

A-MIDSHIPS. The middle of a ship, either with regard to her length or breadth.

TO ANCHOR. To let the anchor fall into the ground, for the ship to ride thereby.

ANCHORAGE. Ground, fit to hold a ship by her anchor.

THE ANCHOR IS A COCK-BILL. The situation of the anchor when it drops down perpendicularly from the cat-head, ready to be sunk at a moment's warning.

AN-END. The position of any mast, &c., when erected perpendicularly on the deck. The top-masts are said to be AN-END when they are hoisted up to their usual stations.

A-PEEK. Perpendicular to the anchor; the cable having been drawn so tight as to bring the ship directly over it. The anchor is then said to be A-PEEK.

A-SHORE. On the shore, as opposed to ABOARD. It also means A-GROUND.

A-STERN. Any distance behind a ship, as opposed to A-HEAD. See BEARING.

AT ANCHOR. The situation of a ship riding by her anchor.

ATHWART. Across the line of a ship's course.

ATHWART-HAUSE. The situation of a ship when driven by accident across the fore-part of another, whether they touch or are at a small distance from each other, the transverse position of the former being principally understood.

ATHWART THE FORE FOOT. When any object crosses the line of a ship's course, but a-head of her, it is said to be ATHWART HER FORE FOOT.

ATHWART-SHIPS. Reaching, or in a direction, across the ship from one side to the other.

ATRIP. When applied to the anchor, it means that the anchor is drawn out of the ground, and hangs, in a perpendicular direction, by the cable, or buoy-rope. The top-sails are said to be ATRIP, when they are hoisted up to the mast-head, or to their utmost extent.

AVAST! The command to stop, or to cease, in any operation.

AWEIGH. The same as ATRIP, when applied to the anchor.

To BACK THE ANCHOR. To carry out a small anchor ahead of the large one, in order to support it in bad ground, and to prevent it from loosening or coming home.

To BACK A-STERN, in rowing, is to impel the boat with her stern foremost, by means of the oars.

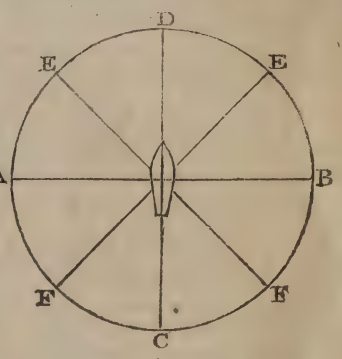
To BACK THE SAILS. To arrange them in a situation that will occasion the ship to move a-stern.

To BAGPIPE THE MIZEN. To lay it a-back, by bringing the sheet to the mizen-shrouds.

To BALANCE. To contract a sail into a narrower compass, by folding up a part of it at one corner. BALANCING is peculiar only to the mizen of a ship, and the mainsail of those vessels wherein it is extended by a boom.

BARE POLES. When a ship has no sail set, she is UNDER BARE POLES.

BEARING. The situation of one place from another, with regard to the points of the compass. The situation also of any distant object, estimated from some part of the ship, according to her situation: these latter bearings are either ON THE BEAM, as A and B; BEFORE THE BEAM, as the arcs A D and D B: ABAFT THE BEAM, as the arcs A C and C B; ON THE LEE OR WEATHER BOW as the lines E E; ON THE LEE OR WEATHER QUARTER, as the lines F F; A-HEAD, as the line D; OR A-STERN, as the line C.

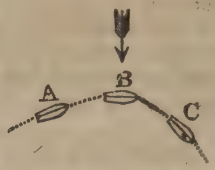


BEAR A HAND. Make haste, dispatch.

To BEAR IN WITH THE LAND is when a ship sails towards the shore.

To BEAR OFF. To thrust or keep off from the ship's side, &c., any weight, when hoisting.

To BEAR UP, OR AWAY. The act of changing a ship's course, to make her sail more before the wind. Thus the ship A bears away from a close-hauled course, when she gets into either of the courses B and C.



BEATING TO WINDWARD. The making a progress against the direction of the wind, by steering alternately close-hauled on the starboard and larboard tacks.

To BECALM. To intercept the current of the wind, in its passage to a ship, by any contiguous object, as a shore above her sails, a high sea behind, &c.; and thus one sail is said to becalm another.

BEFORE THE BEAM denotes an arch of the horizon comprehended between the line of the beam and that point of the compass on which the ship stems. See BEARING.

To BELAY. To fasten a rope, by winding it several times round a cleat or pin.

To BEND A SAIL is to affix it to its proper yard or stay.

BENEAPED. See NEAPED.

BERTH. The station in which a ship rides at anchor, either alone or in a fleet; the due distance between two ships; and also a room or an apartment on board for the officers of a mess.

BETWEEN-DECKS. The space contained between any two decks of a ship.

BILGE-WATER is that which, by reason of the flatness of a ship's bottom, lies on her floor, and cannot go to the well of the pump.

To BITT THE CABLE is to confine the cable to the bitts, by one turn under the cross-piece and another turn round the bitt-head. In this position it may either be kept fixed, or it may be veered away.

BITTER. The turn of the cable round the bitts.

BITTER-END. That part of the cable which stays within-board round about the bitts when the ship is at anchor.

A-BOARD is the distance run by a ship on one tack; thus they say, a *good board*, when a ship does not go to leeward of her course: a *short board* and a *long board*, according to the distance run.

BOARD-AND-BOARD. When two ships come so near as to touch each other, or when they lie side-by-side.

To BOARD A SHIP. To enter an enemy's ship in an engagement.

BOLD SHORE. A steep coast, permitting the close approach of shipping.

BOOT-TOPPING. Cleaning the upper part of a ship's bottom, or that part which lies immediately under the surface of the water; and daubing it over with tallow, or with a mixture of tallow, sulphur, rosin, &c.

BOTH SHEETS AFT. The situation of a ship sailing right before the wind.

BOW-GRACE. A frame of old rope or junk, laid out at the bows, stems, and sides, of ships, to prevent them from being injured by flakes of ice.

To BOWSE. To pull up any body with a tackle, in order to remove it.

BOXHAULING. A particular method of veering a ship, when the swell of the sea renders tacking impracticable.

BOXING. An operation somewhat similar to BOXHAULING. It is performed by laying the head-sails aback, to receive the greatest force of the wind in a line perpendicular to their surfaces, in order to return the ship's head into the line of her course, after she had inclined to windward of it.

To BRACE THE YARDS. To move the yards, by means of the braces, to any direction required.

To BRACE ABOUT. To brace the yards round for the contrary tack.

To BRACE SHARP. To brace the yards to a position, in which they will make the smallest possible angle with the keel, for the ship to have head-way.

To BRACE-TO. To ease off the lee-braces, and round in the weather-braces, to assist the motion of the ship's head in tacking.

To BRAIL UP. To haul up a sail by means of the brails, for the more readily furling it when necessary.

BRAILS. A name peculiar only to certain ropes belonging to the mizen, used to truss it up to the mast. But it is likewise applied to all the ropes which are employed in hauling up the bottoms, lower corners, and skirts, of the other great sails.

To BREAK BULK. The act of beginning to unload a ship.

To BREAK SHEER. When a ship at anchor is forced, by the wind or current, from that position in which she keeps her anchor most free of herself and most firm in the ground, so as to endanger the tripping of her anchor, she is said to break her sheer.

BREAMING. Burning off the filth from a ship's bottom.

BREAST-FAST. A rope employed to confine a ship sideways to a wharf or to some other ship.

To BRING BY THE LEE. See TO BROACH TO.

To BRING TO. To check the course of a ship when she is advancing, by arranging the sails in such a manner as that they shall counteract each other, and prevent her from either retreating or advancing. See TO LIE TO.

To BROACH TO. To incline suddenly to windward of the ship's course, so as to present her side to the wind, and endanger her oversetting. The difference between BROACHING TO and BRINGING BY THE LEE may be thus defined: Suppose a ship under great sail to be steering south, having the wind at NNW.: then west is the weather-side, and east, the lee-side. If, by any accident, her head turns round to the westward, so as that her sails are all taken aback on the weather-side, she is said TO BROACH TO. If, on the contrary, her head declines so far eastward as to lay her

sails aback on that side which was the lee-side, it is called BRINGING BY THE LEE.

BROADSIDE. A discharge of all the guns on one side of a ship both above and below.

BROKEN BACKED. The state of a ship which is so loosened in her frame as to drop at each end.

BY THE BOARD. Over the ship's side.

BY THE HEAD. The state of a ship when she is so unequally loaded as to draw more water forward than aft.

BY THE WIND. The course of a ship as near as possible to the direction of the wind, which is generally within six points of it.

To CAREEN. To incline a ship on one side so low down, by the application of a strong purchase to her masts, as that her bottom on the other side may be cleansed by breaming.

CASTING. The motion of falling off, so as to bring the direction of the wind on either side of the ship after it had blown some time right a-head. It is particularly applied to a ship about to weigh anchor.

To CAT THE ANCHOR is to hook the cat-block to the ring of the anchor and to haul it up close to the cat-head.

CAT'S PAW. A light air of wind perceived at a distance in a calm, sweeping the surface of the sea very lightly, and dying away before it reaches the ship.

CENTRE. This word is applied to that squadron of a fleet, in line of battle, which occupies the middle of the line; and to that column (in the order of sailing) which is between the weather and lee columns.

CHANGE THE MIZEN. Bring the mizen-yard over to the other side of the mast.

CHAPELING. The act of turning a ship round in a light breeze of wind when she is close-hauled, so as that she will lie the same way she did before. This is usually occasioned by negligence in steering or by a sudden change of wind.

CHASE. A vessel pursued by some other.

CHASER. The vessel pursuing.

CHEERLY. A phrase implying heartily, quickly, cheerfully.

To CLAW OFF. The act of turning to windward from a lee-shore to escape shipwreck, &c.

CLEAR is variously applied. The weather is said to be CLEAR when it is fair and open; the sea-coast is CLEAR when the navigation is not interrupted by rocks, &c. It is applied to cordage, cables, &c., when they are disentangled, so as to be ready for immediate service. In all these senses it is opposed to FOUL.

To CLEAR THE ANCHOR is to get the cable off the flukes, and to disencumber it of ropes ready for dropping.

CLEAR HAUSE. When the cables are directed to their anchors without lying athwart the stem.

To CLEAR THE HAUSE is to untwist the cables when they are entangled by having either a cross, an elbow, or a round turn.

CLENCHED. Made fast, as the cable is to the ring of the anchor.

CLOSE-HAULED. That trim of the ship's sails, when she endeavours to make a progress in the nearest direction possible towards that point of the compass from which the wind blows.

To CLUB-HAUL. A method of tacking a ship when it is expected she will miss stays on a lee-shore.

To CLUE UP. To haul up the clues of a sail to its yard by means of the clue-lines.

COASTING. The act of making a progress along the sea-coast of any country.

To COIL THE CABLE. To lay it round in a ring, one turn over another.

To COME HOME. The anchor is said to come home when it loosens from the ground by the effort of the cable, and approaches the place where the ship floated, at the length of her moorings.

COMING TO denotes the approach of a ship's head to the direction of the wind.

COURSE. The point of the compass on which a ship steers.

CRANK. The quality of a ship, which, for want of sufficient ballast, is rendered incapable of carrying sail without being exposed to the danger of oversetting.

To CROUD SAIL. To carry more sail than ordinary.

CUNNING. The art of directing the steersman to guide the ship in her proper course.

To CUT AND RUN. To cut the cable and make sail instantly, without waiting to weigh anchor.

To DEADEN A SHIP'S WAY. To impede her progress through the water.

DEAD WATER. The eddy of water, which appears like whirlpools, closing in with the ship's stern as she sails on.

DISMASTED. The state of a ship that has lost her masts.

DOUBLING. The act of sailing round or passing beyond a cape or point of land.

DOUBLING UPON. The act of enclosing any part of a hostile fleet between two fires, or of cannonading it on both sides.

To DOWSE. To lower suddenly, or slacken.

To DRAG THE ANCHOR. To trail it along the bottom, after it is loosened from the ground.

To DRAW. When a sail is inflated by the wind, so as to advance the vessel in her course, the sail is said TO DRAW; and so TO KEEP ALL DRAWING is to inflate all the sails.

DRIFT. The angle which the line of a ship's motion makes with the nearest meridian, when she drives with her side to the wind and waves, and not governed by the power of the helm. It also implies the distance which the ship drives on that line.

DRIVING. The state of being carried at random, as impelled by a storm or current. It is generally expressed of a ship when accidently broke loose from her anchors or moorings.

DROP. Used sometimes to denote the depth of a sail; as the fore-top-sail DROPS twelve yards.

To DROP ANCHOR. Used synonymously with TO ANCHOR.

To DROP A-STERN. The retrograde motion of a ship.

To EASE, TO EASE AWAY; OR, TO EASE OFF. To slacken gradually; thus they say, EASE the bowline, EASE the sheet.

EASE THE SHIP! The command given by the pilot, to the steersman, to put the helm hard a-lee, when the ship is expected to plunge her fore part deep in the water when close-hauled.

To EDGE AWAY. To decline gradually from the shore or from the line of the course which the ship formerly held, in order to go more large.

To EDGE IN WITH. To advance gradually towards the shore or any other object.

ELBOW IN THE HAUSE. A particular twist in the cables by which a ship is moored; explained heretofore at length.

END-FOR-END. A reversal of the position of any thing is turning it END-FOR-END. It is applied also to a rope that has run quite out of the block in which it was reeved, or to a cable which has all run out of the ship.

END ON. When a ship advances to a shore, rock, &c.: without an apparent possibility of preventing her, she is said to go END ON for the shore, &c.

EVEN KEEL. When the keel is parallel with the horizon, a ship is said to be upon an EVEN KEEL.

FAIR. A general term for the disposition of the wind when favourable to a ship's course.

FAIR-WAY. The channel of a narrow bay, river, or haven, in which ships usually advance in their passage up and down.

To FALL A-BOARD OF. To strike or encounter another ship when one or both are in motion.

To FALL A-STERN. The motion of a ship with her stern foremost.

To FALL CALM. To become in a state of rest by a total cessation of the wind.

To FALL DOWN. To sail or be towed down a river nearer towards its mouth.

FALLING OFF denotes the motion of the ship's head from the direction of the wind. It is used in opposition to COMING TO.

FALL NOT OFF! The command of the steersman to keep the ship near the wind.

To FETCH WAY. To be shaken or agitated from one side to another so as to loosen any thing which was before fixed.

To FILL. To brace the sails so as to receive the wind in them, and advance the ship in her course, after they had been either shivering or braced a-back.

To FISH THE ANCHOR. To draw up the flukes of the anchor towards the top of the bow, in order to stow it, after having been catted.

FLAT-AFT. The situation of the sails when their surfaces are pressed aft against the mast by the force of the wind.

To FLAT IN. To draw in the aftermost lower corner or clue of a sail towards the middle of the ship, to give the sail a greater power to turn the vessel.

To FLAT IN FORWARD. To draw in the fore-sheet, jib-sheet, and fore-staysail-sheet, towards the middle of the ship.

FLAW. A sudden breeze or gust of wind.

FLOATING. The state of being buoyed up by the water from the ground.

FLOOD-TIDE. The state of a tide when it flows or rises.

FLOWING-SHEETS. The position of the sheets of the principal sails when they are loosened to the wind, so as to receive it into their cavities more nearly perpendicular than when close-hauled, but more obliquely than when the ship sails before the wind. A ship going two or three points large has FLOWING SHEETS.

FORE. That part of a ship's frame and machinery that lies near the stem.

FORE-AND-AFT. Throughout the whole ship's length. Lengthwise of the ship.

To FORE-REACH UPON. To gain ground of some other ship.

To FORGE OVER. To force a ship violently over a shoal by a great quantity of sail.

FORWARD. Towards the fore part of a ship.

FOUL is used in opposition both to CLEAR and FAIR. As opposed to CLEAR, we say FOUL WEATHER, FOUL BOTTOM, FOUL GROUND, FOUL ANCHOR, FOUL HAUSE. As opposed to FAIR, we say FOUL WIND.

To FOUNDER. To sink at sea by filling with water.

To FREE. Pumping is said to FREE the ship when it discharges more water than leaks into her.

To FRESHEN. When a gale increases it is said to FRESHEN.

To FRESHEN THE HAUSE. Veering out or heaving in a little cable to let another part of it endure the stress at the hause-holes. It is also applied to the act of renewing the service round the cable at the hause-holes.

FRESH WAY. When a ship increases her velocity she is said to get FRESH WAY.

FULL. The situation of the sails, when they are kept distended by the wind.

FULL-AND-BY. The situation of a ship, with regard to the wind, when close-hauled; and sailing, so as to steer neither too nigh the direction nor to deviate to leeward.

To FURL. To wrap or roll a sail close up to the yard or stay to which it belongs, and winding a cord round it, to keep it fast.

To GAIN THE WIND. To arrive on the weather-side, or to windward of, some ship or fleet in sight, when both are sailing as near the wind as possible.

To GATHER. A ship is said to gather on another as she comes nearer to her.

GIMBLETING. The action of turning the anchor round by the stock, so that the motion of the stock appears similar to that of the handle of a gimblet, when employed to turn the wire.

To GIVE CHASE TO. To pursue a ship or fleet.

GOOSE-WINGS OF A SAIL. The clues or lower corners of a ship's mainsail or foresail, when the middle part is furled or tied up to the yard.

GRIPING. The inclination of a ship to run to windward of her proper course.

GROUNDING. The laying a ship a-shore, in order to repair her. It is also applied to running a-ground accidentally.

GROUND-TACKLE. Every thing belonging to a ship's anchors, and which are necessary for anchoring or mooring; such as cables, hawsers, tow-lines, warps, buoy ropes, &c.

GROWING. Stretching out; applied to the direction of the cable from the ship towards the anchors; as the cable GROWS on the starboard bow.

GYBING. The act of shifting any boom-sail from one side of the mast to the other.

To HAIL. To salute or speak to a ship at a distance.

To HAND THE SAILS. The same as to FURL them.

HAND-OVER-HAND. The pulling of any rope, by the men's passing their hands alternately one before the other or one above another. A sailor is said to go aloft HAND-OVER-HAND, when he climbs into the tops by a single rope, dexterously throwing one hand over the other.

HANDSOMELY. Gradually, as LOWER HANDSOMELY.

HANK-FOR-HANK. When two ships tack and make a progress to windward together.

HARD A-LEE. The situation of the helm, when pushed close to the lee side of the ship.

HARD A-WEATHER. The situation of the helm, when pushed close to the weather side of the ship.

To HAUL. To pull a single rope without the assistance of blocks.

To HAUL THE WIND. To direct the ship's course nearer to the point from which the wind blows. Thus the ship A hauls the wind, when, by the trim of her sails and the action of her rudder, she gets on either of the courses B and C.

HAUSE. The situation of the cables before the ship's stem, when she is moored with two anchors out from forward. It also denotes any small distance a-head of a ship, or the space between her head and the anchors employed to ride her.

HEAD-FAST. A rope employed to confine the head of a ship to a wharf or to some other ship.

HEADMOST. The situation of any ship or ships which are the most advanced in a fleet.

HEAD-SAILS. All the sails which belong to the fore-mast and bowsprit.

HEAD-SEA. When the waves meet the head of a ship in her course, they are called a HEAD-SEA. It is likewise applied to a large single wave coming in that direction.

HEAD-TO WIND. The situation of a ship when her head is turned to the point from which the wind blows, as it must when tacking.

HEAD-WAY. The motion of advancing, used in opposition to STERN-WAY.

To HEAVE. To turn about a capstan, or other machine of the like kind, by means of bars, handspecs, &c.

To HEAVE A-HEAD. To advance the ship by heaving-in the cable or other rope fastened to an anchor at some distance before her.

To HEAVE A-PEEK. To heave-in the cable, till the anchor is a-peek.

To HEAVE A-STERN. To move a ship backwards by an operation similar to that of HEAVING A-HEAD.

To HEAVE DOWN. To CAREEN.

To HEAVE IN THE CABLE. To draw the cable into the ship, by turning the capstan.

To HEAVE IN STAYS. To bring a ship's head to the wind, by a management of the sails and rudder, in order to get on the other tack.

To HEAVE OUT. To unfurl or loose a sail ; more particularly applied to the staysails : thus we say, loose the topsails and HEAVE OUT the staysails.

To HEAVE SHORT. To draw so much of the cable into the ship, as that she will be almost perpendicularly over her anchor

To HEAVE TIGHT OR TAUGHT. To turn the capstan round, till the rope or cable becomes straitened.

To HEAVE THE CAPSTAN. To turn it round.

To HEAVE THE LEAD. To throw the lead overboard, in order to find the depth of water.

To HEAVE THE LOG. To throw the log overboard, in order to calculate the velocity of the ship's way.

To HEEL. To stoop or incline to one side ; thus they say, TO HEEL TO PORT, that is, to heel to the larboard side.

HELM-A-LEE ! A direction to put the helm over to the lee side.

HELM A-WEATHER ! An order to put the helm over to the windward side.

HIGH-AND-DRY. The situation of a ship when so far run aground as to be seen dry upon the strand.

To HOIST. To draw up any body by the assistance of one or more tackles. Pulling by means of a single block is never

termed HOISTING, except only the drawing of the sails upwards along the masts or stays.

To HOLD ITS OWN is applied to the relative situation of two ships when neither advances upon the other; each is then said to HOLD ITS OWN. It is likewise said of a ship which, by means of contrary winds, cannot make a progress towards her destined port, but which however keeps nearly the distance she had already run.

To HOLD ON. To pull back or retain any quantity of rope acquired by the effort of a capstern, windlass, tackle, block, &c.

HOME implies the proper situation of any object; as to haul HOME the topsail-sheets is to extend the bottom of the topsail to the lower yard, by means of the sheets. In stowing a hold, a cask, &c. is said to be HOME, when it lies close to some other object.

To HULL A SHIP. To fire cannon-ball into her hull within the point-blank range.

HULL-TO. The situation of a ship when she lies with all her sails furled; as in TRYING.

IN STAYS. See to HEAVE in stays.

KECKLED. Any part of a cable, covered over with old ropes, to prevent its surface from rubbing against the ship's bow or forefoot.

To KEEP AWAY. To alter the ship's course to one rather more large, for a little time, to avoid some ship, danger, &c. KEEP AWAY is likewise said to the steersman, who is apt to go to windward of the ship's course.

To KEEP FULL. To keep the sails distended by the wind.

To KEEP HOLD OF THE LAND. To steer near to or in sight of the land.

To KEEP OFF. To sail off or keep at a distance from the shore.

To KEEP THE LAND ABOARD. The same as to KEEP HOLD OF THE LAND.

To KEEP THE LUFF. To continue close to the wind.

TO KEEP THE WIND. The same as TO KEEP THE LUFF.

KNOT. A division of the log-line, answering, in the calculation of the ship's velocity, to one mile.

To LABOUR. To roll or pitch heavily in a turbulent sea.

LADEN IN BULK. Freighted with a cargo not packed, but lying loose, as corn, salt, &c.

LAID-UP. The situation of a ship when moored in a harbour, for want of employ.

LAND-FALL. The first land discovered after a sea-voyage. Thus a GOOD LAND-FALL implies the land expected or desired; a BAD LAND-FALL the reverse.

LAND-LOCKED. The situation of a ship surrounded with land, so as to exclude the prospect of the sea, unless over some intervening land.

LARBOARD. The left side of a ship, looking towards the head.

LARBOARD-TACK. The situation of a ship when sailing with the wind blowing upon her larboard side.

LAYING THE LAND. A ship which increases her distance from the coast, so as to make it appear lower and smaller, is said to LAY THE LAND.

LEADING-WIND. A fair wind for a ship's course.

LEAK. A chink or breach in the sides or bottom of a ship, through which the water enters into the hull.

To LEAK. To admit water into the hull through chinks or breaches in the sides or bottom.

LEE. That part of the hemisphere to which the wind is directed, to distinguish it from the other part which is called to windward.

LEE-GAGE. A ship or fleet to leeward of another is said to have the lee-gage.

LEE-LURCHES. The sudden and violent rolls which a ship often takes to leeward, in a high sea; particularly when a large wave strikes her on the weather side.

LEE OF THE SHORE. See UNDER THE LEE OF THE SHORE.

LEE-QUARTER. The quarter of a ship which is on the lee-side.

LEE-SHORE. That shore upon which the wind blows.

LEE-SIDE. That half of a ship lengthwise, which lies between a line drawn through the middle of her length and the side which is farthest from the point of wind.

To LEEWARD. Towards that point of the horizon to which the wind blows.

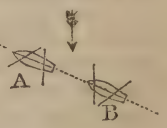
LEEWARD SHIP. A ship that falls much to leeward of her course, when sailing close-hauled.

LEEWARD TIDE. A tide that sets to leeward.

LEE-WAY. The lateral movement of a ship to leeward of her course; or the angle which the line of her way makes with a line in the direction of her keel.

To LIE ALONG. To be pressed down sideways by a weight of sail in a fresh wind.

To LIE TO. To retard a ship in her course, by arranging the sails in such a manner as to counteract each other with nearly an equal effort, and render the ship almost immoveable, with respect to her progressive motion or headway. Thus the position of the yards, in the figures A and B, causes the sail to counteract each other, the wind blowing upon the after-surface of one and the fore-surface of the other.



A LONG SEA. A uniform motion of long waves.

LOOK-OUT. A watchful attention to some important object or event that is expected to arise. Thus persons on board of a

ship are occasionally stationed to LOOK OUT for signals, other ships, for land, &c.

To LOOSE. To unfurl or cast loose any sail.

To LOWER. To ease down gradually.

LUFF! The order to the steersman to put the helm towards the lee-side of the ship, in order to sail nearer to the wind.

To MAKE A BOARD. To run a certain distance upon one tack, in beating to windward.

To MAKE FOUL WATER. To muddy the water, by running into shallow places, so that the ship's keel disturbs the mud at bottom.

To MAKE SAIL. To increase the quantity of sail already set, either by unreefing or setting others.

To MAKE STERNWAY. To retreat or move with the stern foremost.

To MAKE THE LAND. To discover it from afar.

To MAKE WATER. To leak.

To MAN THE YARD, &c. To place men on the yard, in the tops, down the ladder, &c., to execute any necessary duties.

MASTED. Having all her masts complete.

To MIDDLE A ROPE. To double it into two equal parts.

MIDSHIPS. See A-MIDSHIPS.

To MISS STAYS. A ship is said to MISS STAYS, when her head will not fly up into the direction of the wind, in order to get her on the other tack.

MOORING. Securing a ship in a particular station by chains or cables, which are either fastened to an adjacent shore or to anchors at the bottom.

MOORING SERVICE. When a ship is moored, and rides at one cable's length, the mooring service is that which is at the first splice.

NEAPED. The situation of a ship left a-ground on the height of a spring tide, so that she cannot be floated till the return of the next spring tide.

NEAR: or, NO NEAR. An order to the steersman not to keep the ship so close to the wind.

OFF-AND-ON. When a ship is beating to windward, so that by one board she approaches towards the shore, and by the other stands out to sea, she is said to stand OFF-AND-ON-SHORE.

OFFING. Out at sea, or at a competent distance from the shore, and generally out of anchor-ground.

OFFWARD. From the shore; as when a ship lies a-ground and leans toward the sea, she is said to heel OFFWARD.

ON THE BEAM. Any distance from the ship on a line with the beams, or at right angles with the keel. See BEARING.

ON THE BOW. An arch of the horizon, comprehending about four points of the compass on each side of that point to which the ship's head is directed. Thus, they say, the ship in sight bears three points ON THE STARBOARD-BOW; that is, three points towards

the right hand, from that part of the horizon which is right a-head. See BEARING.

ON THE QUARTER. An arch of the horizon, comprehending about four points of the compass on each side of that point to which the ship's stern is directed. See ON THE BOW and BEARING.

OPEN. The situation of a place exposed to the wind and sea. It is also expressed of any distant object to which the sight or passage is not intercepted.

OPEN HAUSE. When the cables of a ship at her moorings lead strait to their respective anchors, without crossing, she is said to ride with an OPEN HAUSE.

OVER-BOARD. Out of the ship.

OVER-GROWN SEA is expressed of the ocean when the surges and billows rise extremely high.

To OVER-HAUL. To open and extend the several parts of a tackle, or other assemblage of ropes, thereby fitting them the better for running easily.

OVER-RAKE. When a ship at anchor is exposed to a head-sea, the waves of which break in upon her, the waves are said to OVER-RAKE HER.

OVER-SET. A ship is OVER-SET, when her keel turns upwards.

OUT-OF-TRIM. The state of a ship when she is not properly balanced for the purposes of navigation.

PARLIAMENT-HEEL. The situation of a ship when she is made to stoop a little to one side, so as to clean the upper part of her bottom on the other side. See BOOT-TOPPING.

PARTING. Being driven from the anchors by the breaking of the cable.

To PAWL THE CAPSTAN. To fix the pawls, so as to prevent the capstan from recoiling, during any pause of heaving.

To PAY. To daub or cover the surface of any body with pitch, tar, &c., in order to prevent it from the injuries of the weather.

To PAY AWAY or PAY OUT. To slacken a cable or other rope so as to let it run out for some purpose particular.

To PAY OFF. To move a ship's head to leeward.

To PEEK THE MIZEN. To put the mizen-yard perpendicular by the mast.

PITCHING. The movement of a ship, by which she plunges her head and after-part alternately into the hollow of the sea.

To PLY TO WINDWARD. To endeavour to make a progress against the direction of the wind. See BEATING TO WINDWARD.

POINT-BLANK. The direction of a gun when levelled horizontally.

POOPING. The shock of a high and heavy sea upon the stern or quarter of a ship, when she scuds before the wind in a tempest.

PORT. A name given on some occasions to the larboard side of the ship ; as, the ship heels to port, top the yards to port ! &c.

PORT THE HELM ! The order to put the helm over to the larboard side.

PORT-LAST. The gunwale.

PORTOISE. The same as PORT-LAST ; TO RIDE A PORTOISE is to ride with the yard struck down to the deck.

PRESS OF SAIL. All the sail a ship can set or carry.

PRIZING. The application of a lever to move any weighty body.

PURCHASE. Any kind of mechanic power employed in raising or removing heavy bodies.

QUARTERS. The several stations of a ship's crew in time of action.

QUARTERING. When a ship under sail has the wind blowing on her quarter.

To RAISE. To elevate any distant object at sea by approaching it ; thus, TO RAISE THE LAND is used in opposition to LAY THE LAND.

To RAKE. To cannonade a ship at the stern or head, so that the balls scour the whole length of the decks.

RANGE OF CABLE. A sufficient length of cable drawn upon deck before the anchor is cast loose, to admit of its sinking to the bottom without any check.

REACH. The distance between any two points on the banks of a river, wherein the current flows in an uninterrupted course.

READY ABOUT ! A command of the boatswain to the crew, and implies that all hands are to be attentive and at their stations for tacking.

REAR. The last division of a squadron, or the last squadron of a fleet. It is applied likewise to the last ship of a line, squadron, or division.

REEF. Part of a sail from one row of eyelet-holes to another. It is applied likewise to a chain of rocks lying near the surface of the water.

REEFING. The operation of reducing a sail by taking in one or more of the reefs.

To REEVE. To pass the end of a rope through any hole, as the channel of a block, the cavity of a thimble, &c.

RENDERING. The giving way or yielding to the efforts of some mechanical power. It is used in opposition to jambing or sticking.

RIDING, when expressed of a ship, is the state of being retained in a particular station by an anchor and cable. Thus she is said to RIDE EASY or to RIDE HARD, in proportion to the strain upon her cable. She is likewise said to RIDE LEEWARD TIDE, if anchored in a place at a time when the tide sets to leeward, and

TO RIDE WINDWARD TIDE if the tide sets to windward: to RIDE BETWEEN WIND AND TIDE, when the wind and tide are in direct opposition, causing her to ride without any strain upon her cables.

RIGGING OUT A BOOM. The running out a pole at the end of the yard to extend the foot of a sail.

To RIG THE CAPSTAN. To fix the bars in their respective holes.

RIGHTING. Restoring a ship to an upright position, either after she has been laid on a careen, or after she has been pressed down on her side by the wind.

To RIGHT THE HELM is to bring it into midships, after it has been pushed either to starboard or larboard.

ROLLING. The motion by which a ship rocks from side to side, like a cradle.

ROUGH-TREE. A name applied to any mast, yard, or boom, placed in merchant-ships, as a rail or fence above the vessel's side, from the quarter-deck to the fore-castle.

ROUNDING-IN. The pulling upon any rope which passes through one or more blocks in a direction nearly horizontal; as, ROUND-IN the weather braces.

ROUND-TURN. The situation of the two cables of a ship when moored, after they have been several times crossed by the swinging of the ship.

ROUNDING-UP. Similar to ROUNDING-IN, except that it is applied to ropes and blocks which act in a perpendicular direction.

To ROW. To move a boat with oars.

ROWSING. Pulling upon a cable or rope without the assistance of tackles.

To RUN OUT A WARP. To carry the end of a rope out from a ship in a boat, and fastening it to some distant object, so that the ship may be removed by pulling on it.

To SAG TO LEEWARD. To make considerable lee-way.

SAILING-TRIM is expressed of a ship when in the best state for sailing.

SCANTING. The variation of the wind, by which it becomes unfavourable to a ship's making great progress, as it deviates from being large, and obliges the vessel to steer close-hauled, or nearly so.

SCUDDING. The movement by which a ship is carried precipitately before the wind in a tempest.

SCUTTLING. Cutting large holes through the bottom or sides of a ship, either to sink her or to unlade her expeditiously when stranded.

SEA. A large wave is so called. Thus they say, a HEAVY SEA. It implies likewise the agitation of the ocean, as, a GREAT SEA. It expresses the direction of the waves, as, a HEAD SEA. A LONG SEA means a uniform and steady motion of long and extensive

waves ; a SHORT SEA, on the contrary, is when they run irregularly, broken, and interrupted.

SEA-BOAT. A vessel that bears the sea firmly, without straining her masts, &c.

SEA-CLOTHES. Jackets, trousers, &c.

SEA-MARK. A point or object on shore conspicuously seen at sea.

SEA-ROOM. A sufficient distance from the coast or any dangerous rocks, &c. : so that a ship may perform all nautical operations without danger of shipwreck.

SENDING. The act of pitching precipitately into the hollow between two waves.

SETTING. The act of observing the situation of any distant object by the compass.

To SET SAIL. To unfurl and expand the sails to the wind, in order to give motion to the ship.

To SET UP. To increase the tension of the shrouds, backstays, &c., by tackles, laniards, &c.

To SETTLE THE LAND. To lower in appearance. It is synonymous with TO LAY THE LAND.

To SHAPE A COURSE. To direct or appoint the track of a ship in order to prosecute a voyage.

SHEERING. The act of deviating from the line of the course, either to the right or left.

To SHEER OFF. To remove to a greater distance.

To SHEET-HOME. To haul the sheets of a sail home to the block on the yard-arm.

To SHIFT THE HELM. To alter its position from starboard to port, or from port to starboard.

To SHIP. To take any person, goods, or article, on board. It also implies to fix any thing in its proper place ; as, to SHIP THE OARS, to fix them in their rowlocks.

SHIVERING. The state of a sail when fluttering in the wind.

SHOAL. Shallow.

To SHOE THE ANCHOR. To cover the flukes with a piece of plank to give it firmer hold in soft ground.

To SHOOT A-HEAD. To advance forward.

SHORE. A general name for the sea-coast of any country.

To SHORTEN SAIL. Used in opposition to MAKE SAIL.

SLACK WATER. The interval between the flux and reflux of the tide, when no motion is perceptible in the water.

SLATCH is applied to the period of a transitory breeze.

To SLIP THE CABLE. To let it run quite out when there is not time to weigh the anchor.

SLOPS. Look to SEA-CLOTHES.

To SLUE. To turn any cylindrical piece of timber about its axis without removing it. Thus, to SLUE A MAST OR BOOM, is to turn it in its cap or boom-iron.

SOUNDING. Trying the depth of the water with a plummet sunk from a ship to the bottom.

To SPELL THE MIZEN. To let go the sheet and peek it up.

To SPILL. To discharge the wind out of the cavity or belly of a sail, when it is drawn up in the brails, in order to furl or reef it.

SPLIT. The state of a sail rent by the violence of the wind.

SPOON-DRIFT. A sort of showery sprinkling of the sea-water, swept from the surface of the waves in a tempest, and flying like a vapour before the wind.

SPRAY. The sprinkling of a sea, driven occasionally from the top of a wave ; but not continual, as SPOON-DRIFT.

To SPRING A MAST, YARD, &c. To crack a mast, yard, &c., by means of straining in blowing weather, so that it is rendered unsafe for use.

To SPRING A LEAK. When a leak first commences, a ship is said to SPRING A LEAK.

To SPRING THE LUFF. A ship is said to SPRING HER LUFF when she yields to the effort of the helm, by sailing nearer to the wind than before.

SQUALL. A sudden violent blast of wind.

SQUARE. This term is applied to yards that are very long, as TAUNT is to high masts.

To SQUARE THE YARDS. To brace the yards, so as to hang at right angles with the keel.

To STAND ON. To continue advancing.

To STAND IN. To advance towards the shore.

To STAND OFF. To recede from the shore.

STARBOARD. The right hand side of the ship, when looking forward.

STARBOARD-TACK. A ship is said to be on the STARBOARD-TACK, when sailing with the wind blowing upon her starboard-side.

STARBOARD THE HELM ! An order to push the helm to the starboard-side.

To STAY A SHIP. To arrange the sails and move the rudder, so as to bring the ship's head to the direction of the wind, in order to get her on the other tack.

STEADY ! The order to the helmsman to keep the ship in the direction she is going at that instant.

STEERING. The art of directing the ship's way by the movement of the helm.

STEERAGE-WAY. Such degree of progressive motion of a ship as will give effect to the motions of the helm.

To STEM THE TIDE. When a ship is sailing against the tide at such a rate as enables her to overcome its power, she is said to STEM THE TIDE.

STERNFAST. A rope confining a ship by her stern to any other ship or wharf.

STERNMOST. The farthest a-stern, opposed to HEADMOST.

STERNWAY. The motion by which a ship falls back with her stern foremost.

STIFF. The condition of a ship when she will carry a great quantity of sail without hazard of oversetting. It is used in opposition to CRANK.

To STOW. To arrange and dispose a ship's cargo.

To STREAM THE BUOY. To let it fall from the ship's side into the water, previously to casting anchor.

To STRIKE. To lower or let down any thing. Used emphatically to denote the lowering of colours, in token of surrender to a victorious enemy.

TO STRIKE SOUNDINGS. To touch ground, when endeavouring to find the depth of water.

SURF. The swell of the sea that breaks upon shore or on any rock.

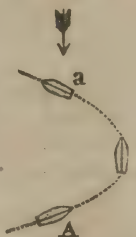
To SURGE THE CAPSTAN. To slacken the rope hove round upon it.

SWELL. The fluctuating motion of the sea either during or after a storm.

SWEEPING. The act of dragging the bight or loose part of a rope along the surface of the ground, in a harbour or road, in order to drag up something lost.

SWINGING. The act of a ship's turning round her anchor at the change of wind or tide.

To TACK. To turn a ship about from one tack to another, by bringing her head to the wind. Thus, the ship A passes from the larboard to the starboard tack a.



TAKING-IN. The act of furling the sails. Used in opposition to SETTING.

TAKEN A-BACK. See A-BACK.

TAUGHT. Improperly, though very generally, used for TIGHT.

TAUNT. High or tall: Particularly applied to masts of extraordinary length.

TENDING. The turning or swinging of a ship round her anchor in a tide-way at the beginning of ebb and flood.

THWART. See A-THWART.

THWART-SHIPS. See A-THWART SHIPS.

THUS! An order to the helmsman to keep the ship in her present situation, when sailing with a scant wind.

TIDE-WAY. That part of a river in which the tide ebbs and flows strongly.

TIER. One range of any thing placed horizontally.

TOPPING. Pulling one of the ends of a yard higher than the other.

To TOW. To draw a ship in the water by a rope fixed to a boat or other ship which is rowing or sailing on.

TRIM. The state or disposition by which a ship is best calculated for the purposes of navigation.

To TRIM THE HOLD. To arrange the cargo regularly.

To TRIM THE SAILS. To dispose the sails in the best arrangement for the course which a ship is steering.

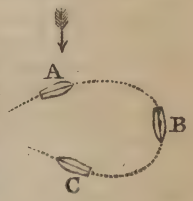
To TRIP THE ANCHOR. To loosen the anchor from the ground, either by design or accident.

TROUGH OF THE SEA. The hollow between two waves.

TRYING. The situation in which a ship, in a tempest, lies-to in the trough or hollow of the sea, particularly when the wind blows contrary to her course.

TURNING TO WINDWARD. That operation in sailing, whereby a ship endeavours to advance against the wind.

VAN. The foremost division of a fleet in one line. It is likewise applied to the foremost ship of a division.



To VEER. To change a ship's course, from one tack to the other, by turning her stern to windward: thus the ship A veers in passing from the course A to the course C. The wind is said to veer when it changes more aft.

To VEER AND HAUL. To pull a rope tight, by alternately drawing it in and slackening it.

To UNBALLAST. To discharge the ballast out of a ship.

To UNBEND. To take the sails off from their yards and stays: to cast loose the anchor from the cable: to untie two ropes.

To UNBIT. To remove the turns of a cable from off the bits.

Under FOOT is expressed of an anchor that is directly under the ship.

UNDER SAIL. When a ship is loosened from moorings, and is under the government of her sails and rudder.

UNDER WAY. The same as UNDER SAIL.

UNDER THE LEE OF THE SHORE, is to be close under the shore which lies to windward of the ship.

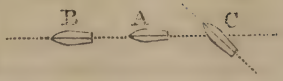
To UNMOOR. To reduce a ship to the state of riding at single anchor, after she has been moored.

To UNREEVE. To draw a rope from out of a block, thimble, &c.

To UNRIG. To deprive the ship of her rigging.

WAKE. The print or track impressed upon the surface of water by a ship in her course. A ship is said to be IN THE WAKE of another, when she follows her in the same track, or on a line supposed to be formed on a continuation of her keel. Thus the

ship A is sailing in the wake of B, and the ship C is crossing in the wake of A and B.



To WARE. See TO VEER.

WARP. A small rope employed occasionally to remove a ship from one place to another.

To WARP. To remove a ship by means of a warp.

WATER-BORNE. The state of a ship, when there is barely a sufficient depth of water to float her off from the ground.

WATER-LOGGED. The state of a ship, become heavy and inactive on the sea, from the great quantity of water leaked into her.

WATER-TIGHT. The state of a ship when not leaky.

WEATHER. Synonymous with WINDWARD.

WEATHER-BEATEN. Shattered by a storm.

WEATHER-BIT. A turn of the cable about the end of the windlass.

WEATHER-GAGE. When a ship or fleet is to windward of another, she is said to have the WEATHER-GAGE of her.

WEATHER-QUARTER. That quarter of the ship which is on the windward side.

WEATHER-SIDE. The side upon which the wind blows.

To WEIGH ANCHOR. To heave up an anchor from the bottom.

To WIND A SHIP. To change her position, bringing her head where her stern was.

WIND-ROAD. When a ship is at anchor, and the wind, being against the tide, is so strong as to overcome its power and keep the ship to leeward of her anchor, she is said to be WIND-ROAD.

WIND's EYE. The point from which the wind blows.

To WINDWARD. Towards that part of the horizon from which the wind blows.

WINDWARD-TIDE. A tide that sets to windward.

To WORK A SHIP. To direct the movements of a ship, by adapting the sails and managing the rudder according to the course the ship has to make.

To WORK TO WINDWARD. To make a progress against the direction of the wind.

YAWING. The motion of a ship, when she deviates from her course to the right or left.

PART II.

THE

THEORY OF WORKING SHIPS.

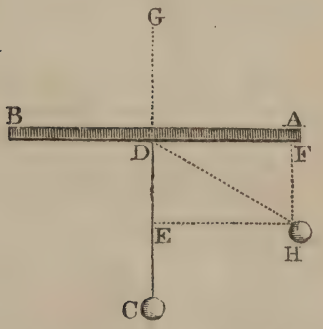
THE theory of working ships is merely the demonstration, supported with proofs, of the effects of every sail, and of the rudder, separately or altogether considered, both with respect to the points where these machines are placed in the ship, and with respect to the different dispositions which are either given to them in the changes of evolutions, or which arise from their various degrees of obliquity, when they present their surfaces to the course of the water or the wind.

LEMMA.

1. IF A BODY STRIKES A SURFACE, IT COMMUNICATES TO IT ALL ITS PERPENDICULAR MOTION.

DEMONSTRATION.

FIGURE 2.



If the body C meets the surface A B, with a motion perpendicular to its middle, or centre of gravity D, it will do it with the strength of all its perpendicular motion, which is the product of its weight by its velocity; and will force it in the direction D G, perpendicular to A B. If the same body meets the same surface obliquely, and with the same velocity, it will impel it in the direc-

tion D G, with the velocity only of D E, which is equal to the angle of incidence H F. For, H F expresses the perpendicular velocity of the body H, towards the surface: and this is evident, if we consider that the movement H D is composed of the two movements H F and H E; and that there is no other movement but H F only which can meet the surface A B, since the other H E is parallel to it.

But the part H F, of the motion of the body H, is perpendicular to the surface A B: whence it follows, that the body H impels, in the like perpendicular manner, that surface in the direction D G, with a force equal to the product of its weight by the velocity H F.

CHAPTER I.

OF THE ACTION WHICH WATER AND WIND HAVE, BY THEIR PRESSURE, ON SURFACES.

2. FLUIDS are formed of an infinite number of particles, the minuteness of which is the cause why they communicate, by their shock, but very imperceptible degrees of motion, in the first instant of their action; and such is the weakness of their action, that it requires to be very often repeated, before they can produce any sensible effect on the bodies they are to move.

It is easy to conceive that, the more specific gravity a body is possessed of, the stronger its impulse must be: therefore water, which weighs nearly eight hundred and fifty times more than air, ought to produce (the velocity being the same) an impulsion eight hundred and fifty times more forcible than air, if impinged against a surface of the same size, moved in directions perfectly similar. And when it is known that the impulse of a fluid depends on its specific gravity, it will be easily understood that such an impulse must depend also on the extent of the surface which is struck. For it is plain that, the greater the surface is, (the gravity, the velocity, and the direction, of the fluid being the same,) the stronger the impulse will be, admitting still the same proportion to be kept between the extent of that fluid's surface and that of any other surface put in comparison with it; because a surface of twelve superficial feet will, it is to be presumed, receive twelve times as much impulsion as would a surface of only one foot square. We must observe here, at the same time, that such parts of the fluid, as strike, find more or less difficulty to recoil after the shock, according as the surface is more or less extensive; because, the greater the surface struck, the longer is the continuance of repulsion from their former directions, impressed on the particles; which, by that very act of repulsion, receive a new direction, by which they are made to lose, for a while, the first movement they had: whence it follows that the shock of the sub-

sequent particles, being forced into a contrary direction, must be, in some slight degree, altered: but this deviation from the direct line of the subsequent particles may be accounted as almost naught, since there is very little wanting, which can prevent us from reckoning all impulsions as being in the reciprocal proportions which exist between them and the surfaces on which they strike, allowing always other circumstances to be alike.

3. It must be observed that the rapidity of the fluid contributes more than in its *simple* ratio, to the force of the impulse; for every particle strikes with the more strength as it acts with a greater velocity, and is at the same time followed by a greater number of new particles to shock the surface. So that the greater the celerity of the particles, the greater is the number of those which share the action, and the more powerful is the resistance they oppose to their being put out of their direct motion.* Whence it may be concluded that impulsions are between themselves in more than the simple ratio of velocity, when all other circumstances are the same.

When a moving surface is exposed to the course of a fluid, it is indifferent whether we consider that the fluid shocks the surface, or that the surface moves the fluid: or, again, whether we consider the fluid and the surface as having each their respective share of the velocity with which that surface receives the impulse of the fluid.

4. When the wind has little velocity, its action is observed to be but faint; but, when moving with rapidity, then it becomes capable of producing the greatest effects. This is easy to be conceived; for, if to the action of every particle of air, which is stronger by reason of its increased celerity, be added a greater number of particles striking at the same time, it is evident that its force will increase according to the principle which has already been demonstrated.

The same may be said of water, the impulse of which is almost like that of a solid when it acts, or is acted upon, with a great rapidity of motion. Whence we must conclude that, if water meets perpendicularly a body that presents to it a great superficies, such a body must have the greatest solidity in order to resist it.

5. Experience confirms this principle. For, a ship which drives to leeward does not divide the fluid with her side in a direct line; there is always some obliquity in the direction she pursues by her act of dividing. This obliquity proceeds from the little resistance she experiences from the fluid, either at her stem or at her stern. So that, should she be driven ever so little to leeward, she glides always obliquely on the column of water which opposes her under her lee, following a line more or less close to the direction of her length, than to the perpendicular which may

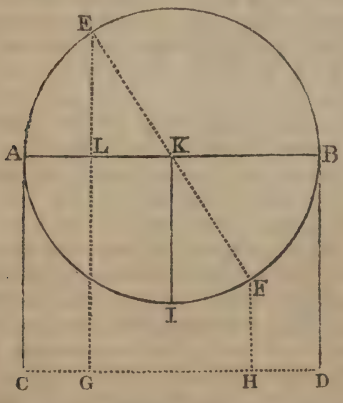
* See hereafter a chapter on the Theory of Fluid Resistance.

be conceived to be drawn as lateral to her keel; and consequently parallel with her side.

6. We have hitherto spoken of the impulse of fluids upon surfaces only, when considered as perpendicular; but, when that impulse becomes oblique, it is clear that it must undergo a great diminution; since the motion of every particle will be discomposed, on account of its acting only by a motion perpendicular to the surface, as has been demonstrated, (*fig.* 2,) where the body H may be considered as a particle of fluid, the impulse of which is proportionably less as the sine of the angle of incidence H D F is diminished; therefore, in this case, when we consider the particle H as a body, its impulse will be in the proportion of the sines of the different angles of incidence, which always express their respective velocities, these being considered in a direction perpendicular to the surfaces.

7. If, instead of one particle, we consider the whole surface as exposed to the course of all those which compose a fluid; it will appear evident, from what has been said, that the surface E F, (*fig.* 3) which is oblique to the course of the fluid, presents to that fluid a less surface than it would if it were perpendicular to it, like A B. So that the particles which are at the same time contributing to the shock are less in number. Therefore, as soon as the impulse of a fluid, which strikes a surface perpendicularly, is known, that impulse, when it strikes the surface obliquely, is only to be diminished in the same proportion as the sine total I K is to the sine of incidence L K.

FIGURE 3.



The surface A B (*fig.* 3) receives all the direct impulse of the fluid which strikes it perpendicularly, and which is contained between C D: but the same surface, presented obliquely to the fluid in the direction E F, will receive but a part of the impulse, which

will be proportional to the sine of incidence K L, compared with the sine total I K.

8. It follows (§ .) that we ought not to be surprised at beholding the velocity of a ship diminish considerably, when, after having run with the wind aft or large, the vessel is hauled closer to the wind. For it is evident that all the sails, which can possibly be spread in this last direction, will receive but very little impulse, on account of their great obliquity to the wind, with which they cannot make an angle more open than 30 degrees, and sometimes much less, as will be demonstrated hereafter. So that the impulse has diminished in more than the proportion of the sine total to the sine of incidence of 30 degrees. Therefore, the sails, receiving but a very faint impulse, can communicate to the ship but a small motion; and that motion is still enfeebled by the resistance of the water on the lee-bow; which resistance increases, on one hand, by the inclination of the ship; and, on the other, by the greater surface which she presents to the water in the direction of her length; to which must be added, the decomposition of the absolute effort of the sails, the lateral part of which is now become much greater than the direct. Hence we find the rapidity of the ship's way is already diminished from three evident causes, to which another may still be added; and it is this: if the ship has an inclination to the horizon, (as this always happens in oblique courses, and as we have already hinted,) and if the wind has ever so little force, there will result again from that circumstance a cause of diminution of impulse of the wind on the sails; because, in such a case, the sails follow that particular inclination of the ship called *heeling*. Therefore we see that the absolute sine of incidence diminishes in a twofold proportion, and receives that diminution from the compound ratio of the proportion which the sine total bears to the two sines: (of the obliquity of the yard with the wind and of the inclination of the sail with the wind.)

9. The impulse of the wind, being continual, must necessarily communicate to the ship degrees of velocity, which, from instant to instant, are increasing, until there happens to be an equilibrium between the impulse of the wind on the sails and the resistance of the water on the bows; observing that, in the courses where the ship sails with the wind abaft the beam, the first moment when the wind strikes the sails is the time when its impulse is greatest, and the resistance of the water the weakest; because, at that instant, the ship does not yet move in the fluid, not having yielded to the power of the wind: but, in a few moments, the velocity of the ship increasing, the resistance of the water on the bows increases also considerably: then the impulse of the wind on the sails is proportionably decreasing, because, the ship, receding, as it were, from the wind, must of course lessen its power on the sails. Thus, the accelerating force is incessantly lessening from two causes: firstly, from the wind striking the sails with less force:

and, secondly, from the greater part of its impulse being destroyed by the resistance of the water on the bows ; a resistance which increases in proportion as the ship's way accelerates ; for, this opposition of the water is as a deduction from the effort of the wind ; since, by its resistance, the water renders part of that effort ineffectual. Therefore, the rate of sailing will be the greatest possible, when the impulse of the wind upon the sails shall be so diminished, and the resistance of the water on the bows so increased, as that the two forces, acting in contrary directions, are in a perfect equilibrium. Hence we must conclude, that the vessel will now enjoy a constant and uniform motion ; for, the ship advances as if she were not subject to the action of any exterior force, the wind no longer having power to increase her velocity, because the resistance of the water on her bows prevents it ; and on the other hand, the impulse of the wind hinders the water, by its resistance, from retarding her course.

10. If a ship runs on a line perpendicular to the direction of the wind, the impulse on the sails is always the same, because she does not recede from the point from which the wind blows ; but, when she sails close-hauled, the impulse must be stronger ; because she runs to windward, and draws nearer to that point. So that, if the rate of the ship's sailing be great, the apparent angle of incidence diminishes in proportion to the two velocities, viz. that of the wind and that of the ship.

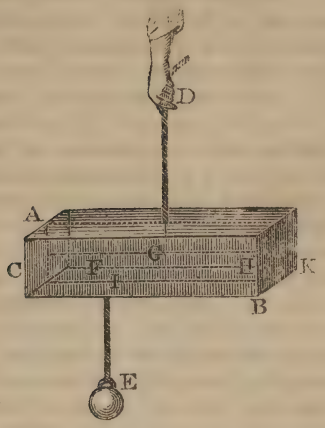
The moment a surface, which is suspended or a-float, is struck by a fluid, that is the time of the greatest impulsion, (if it were not in motion before,) and of the greatest resistance of the surface.

CHAPTER II.

OF THE CENTRE OF GRAVITY.

11. EVERY solid has a centre of gravity ; that is to say, a point, on which, being suspended, it will have a perfect equilibrium ; and on that point all the gravity of the body is united. Such, for example, is the rectangular parallelopipedon A B, (*fig.* 4,) the centre of gravity of which is exactly in the middle of the solid G ; so that, if it be suspended from that point, as from G to D, it will always be in equilibrium ; because that solid being considered as regular, one of its halves must exactly balance the other ; and, were it not regular the operation for finding this centre would be much more complicated. Without therefore engaging in abstract difficulties, it will be sufficient for our pur-

FIGURE 4.



pose to make it appear that, the centre of gravity of a body, heavier at one extremity than at the other, lies always in the heaviest part, with respect to the point which marks the middle of the length of the body. If, to the solid A B, which is suspended in perfect equilibrium by its centre of gravity G, be added a weight E, in the centre of the part A G, the equilibrium will then be lost, as it will increase the weight of this part, which will then overweigh the other half B G by all the weight E, of which the part B G becomes by so much the lighter. To find, then, the centre of gravity, which is changed from G to I, we must divide the interval F H reciprocally to the weight of the two bodies; A G + E for the one, and B G for the other: for it may be supposed that, this half A G of the parallelepipedon, *plus* the weight E, is a body suspended by the centre F of the part A G; and that this point is the extremity of a lever F H, infinitely light, which bears also, at the other extremity H, taken for the centre of the other part B G, all the weight of that part: so that, if the body A G + E weighs four times as much as the other weight B G, we have but to make the interval F I the fourth part of the other I H, and the point I will then be the centre of gravity required of the solid A B + E, and the two bodies suspended by that point will be in perfect equilibrium; for, the weight A G + E is four times as heavy as the other B G; but it acts with an arm of a lever F I, which is only a fourth part of the other I H; therefore the two weights, suspended by the point I, will preserve a perfect equilibrium in whatever situation they may be placed, as they make, in fact, both but one, the heaviness of which may be supposed united in the single point I.

12. It follows, from what has been demonstrated, that a long lever is productive of a greater effect than a short one, when

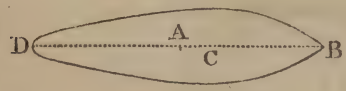
both are actuated by the same force; whence we must conclude, that the longest lever, or the greatest distance from the *fulcrum*, or point of support, is proportional to the greatest weight.

It is very easy to be convinced of this truth if we make one of the two following proportions; first, thus; the sum of the two weights AG + E + BG : FH :: BG : FI; or :: AG + E : IH.

We have supposed that the weight AG + E (*fig.* 4) weighs four times as much as the other BG, which suppose to be two pounds; so that the sum total will be ten pounds. Then say: Ten, the sum of the two weights, is to the whole lever FH as two pounds, is to the lesser part FI of the lever, divided into five equal parts: so that, if FI is equal to two feet, IH will be equal to eight feet, and FH equal to ten feet. But we have also this proportion to make, viz. Ten pounds, the sum of the two weights, is to ten feet, the whole length of the lever, as eight pounds are to eight feet; but, admitting the distance FH to be ten feet, the distance FI is found to be two feet, and of HI, eight feet; which demonstrates that, a power of two pounds on a lever of eight feet is equal to a power of eight pounds on a lever of two feet; for, the product of the extremes, in both the one and the other proportion, is equal to that of their means.

It ought also to be observed, that the centre of gravity of a solid follows always the greatest weight with respect to the middle G, (*fig.* 4.) since the point I is four times as near the centre F of the heaviest body as it is to the centre H of the lightest body.

FIGURE 5.



13. It follows that the centre of gravity C of a ship (*fig.* 5) is always before the point A, which is the middle of her absolute length; for, the fore part BA, having more capacity than the after part AD, must of course have also more weight: therefore it carries the centre of gravity C forward, in proportion to its greater weight, (which in large ships is from fifty to eighty tons,) and to the interval there is between every centre of gravity of each particular part, both forward and aft.

14. When a ship is at sea, and loaded, the centre of gravity may well be supposed not to change, unless the cargo be moved.

But it must be observed that, according to experience, the fore or after part of the bottom of a ship plunges and labours more and more, in proportion as the wind acts with more or less force on the sails; because ships are generally not masted according to the

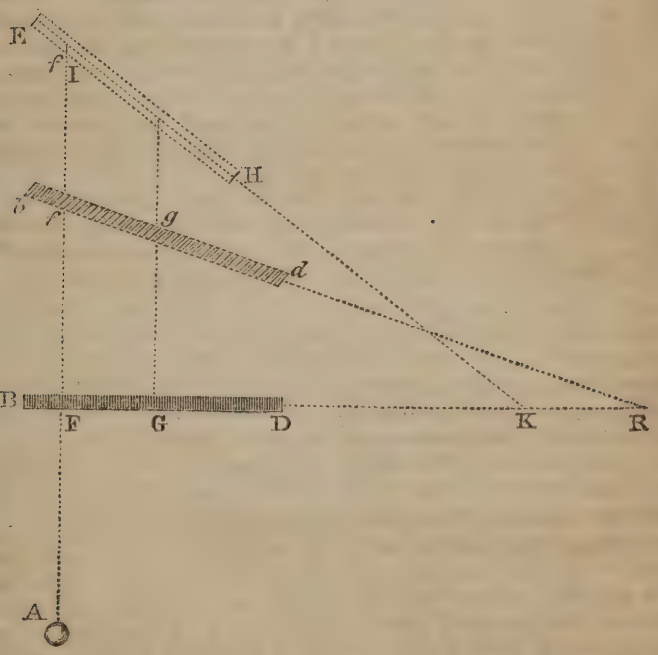
point velique:* so that a ship, which has the centre of the effort of her sails ill-placed, draws always more water forward or aft, if the impulse of the wind upon her sails is very powerful, than when she is at ease under burthen.

THEOREM.

15. The centre of rotation, or the point on which a body turns freely, is always on the other side of the centre of gravity of that body, with respect to the point on which the moving force acts.

DEMONSTRATION.

FIGURE 6.



If the body B D (*fig.* 6) be struck in its centre of gravity G, when it is perfectly at rest, it is evident (§ 1.) that the two extremities B and D will advance equally on parallels ; but, if it is struck

* From the centre of gravity of the floating line of a ship let a perpendicular be raised, and continued till intersected by the direction of the impulse of the water on the bows, in sailing directly before the wind ; and, where these two lines cut each other, there is the *point velique*, and where the centre of effort of all the sails should be placed.

in the point F, distant from the centre of gravity, by any *mobile* such as A, when the body is subject to no friction, it will then have two motions with respect to its centre of gravity G, on which are collected all the weight and the resistance. For that centre, not being held by any thing, is moved in the direction G *g*, parallel to the direction A I, of the effort of the mobile A, which strikes the body B D in the point F. So that the part B G of that body receives the shock of the mobile A, which makes it pass from F to *f*, according to the direction of its motion A I. And, as the other part G D of the same body shares that motion only in proportion as its parts are less distant from the point of percussion F, (since the nearest parts of that point receive the greater share of the action,) in proportion as they remove from their first situation, they all describe, by the first effect of the shock, parallels B *b*, G *g*, and D *d*, to the direction A I of the effort of the mobile A. These parallels are greater as they are more distant from the part shocked, and from its extremity B; because the resistance, which the body B D makes against receiving the motion, cannot be in equilibrium with that which the power A makes to lose part of its own motion, but as much as the two resistances are equal and directly contrary: therefore, the body B D yielding to the impulse of the mobile A, does not oppose to it a resistance equal to its shock; it must then change its place and situation, in turning on the point R, marked by the meeting of two lines D R and *d* R, drawn from the centre of gravity of the body B D in those two situations before and after the shock; and as the circular motion of the body B D is made always round the centre of gravity, it is easy to conceive that the centre, having taken the velocity G *g*, must continue to move equally in the same right line prolonged; and that the body having begun to turn, it must continue to do the same round its centre of gravity, and at the same time be carried in the direction A I on the parallels B E and D H, as long as the force which puts it in motion exists. But it must be remarked that, in proportion as it shall remove from its first situation B D, it will lose all the relations it had in the principle of motion with the point R; that is to say; that the point G, being transported to *g*, in the first instant of the shock, it will continue, in the second and the following instants, to be thus transported on the same line and in the same direction: therefore the point of rotation R will change in proportion as the body B D removes from the second situation *b d* to take another E H; for, the line H K will cut D R in a point K, nearer the point from which the body was moved; and, although the point of rotation R be continually changing during the time of motion, it remains always on the other side of the centre of gravity with respect to the point of percussion, till at last the body B D be so much turned, that the effort A I may pass through the centre of gravity G in the direction D É; then the body D B will cease to turn round a point situated on the part G D prolonged, and

will turn successively on different points of the part G B, which will then have passed to the opposite side.

16. If the force of the mobile A, (fig. 6,) employed to turn the body B D, be greater or less, the velocity G *g* of the centre of gravity will be likewise increased or diminished in proportion as the mobile shall act with more or less power. Consequently, when the body B D changes its situation, the angle it will make with its first position will be proportional to the motion G *g*, or to the force employed in the shock, since they are correspondent to one another. Therefore, all other circumstances being the same, the rapidity of the circular motion will be always in proportion to the force employed to produce it.

17. A method of increasing the rapidity of motion and the angle of rotation is to make the power A (fig. 6) act on a point more distant from the centre of gravity G than the given point F; for, it is clear, that, if the distance G F be two or three times augmented, the other distance G R, from the centre of gravity to the point of rotation, will become two or three times less; and the sides of the triangle G R *g*, becoming consequently shorter, it follows, that the angle will be more open in the same proportion. Therefore it is demonstrated that there are two sure methods of augmenting both the angle and motion of rotation of a body: the first consists of employing more force in the percussion, in order that the angle G R *g* should be as much increased as is the side G *g* which subtends it; and,

The second is to apply that force at a greater distance from the centre of the body you wish to turn; for, in augmenting F G, G R is diminished; and the more the sides which form an angle are shortened, (the side which subtends it still remaining the same,) the more the angle is augmented.

So that the angle of rotation is in a compound proportion both to the force employed and to the distance of that force from the centre of gravity: this angle is then as the product of that force multipled by F G. Although the body be perfectly free, and take a direct motion G *g*, we must consider its centre of gravity G as the point of support, or F G as the arm of a lever; and the angle of rotation B R *b* is always proportional to the *absolute force** employed in the percussion.

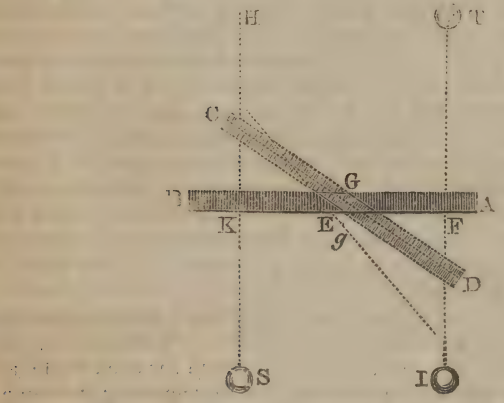
18. Let us consider (*fig.* 6) the body B D exposed to the action of several forces at the same time, and it will appear that the angle of rotation will be proportional to the sum or difference of the absolute forces, according as they tend to turn the body B D in the same or in contrary directions.

If the acting forces directly counteract each other, it is plain that their absolute effect, with respect to the centre of gravity G, must be sought, and then deduct the excess of one from the other:

* By the term *absolute force*, we understand the force employed to turn the body, multiplied by the distance F G, from the centre of gravity.

then the angle of rotation will be proportional to that excess: instead of which, it will be proportional to the sum of the forces employed, if they act in concert and in the same manner, to augment it. But if no notice be taken of the rotatory angle, and the centre of gravity considered as only transported from G to g, it is not necessary to find the sum of the absolute forces of the acting powers, but only to consider the forces in themselves, and then G g will be found proportional to either their sum or their difference, according as they contribute to produce the same effect, or as they are opposite in their efforts.

FIGURE 7.



Suppose these forces equal between themselves, but acting in contrary directions on the extremities A and B (*fig.* 7) of the body A B, and on arms of equal levers. Then it is evident that the angle of rotation is double what it would be if the body were struck by only an individual force, and turned on its centre of gravity; since the two parts, separated by the centre, are struck equally and at the same time by forces which act perpendicularly in contrary directions. To prove this, observe that the equal powers S and T act at the same time on the body A B with equal levers, G K and G F; so that the extremity B passes to C at the same time that A passes to D; and thereby the centre of gravity G remains as if it were fixed in the same point which serves as a centre of rotation: for, if one of the acting forces removes it from its first situation, the other, in opposing an equal force, will replace it.

If the power T exceeds the other S, it is evident that the centre of gravity G will be transported towards g, in proportion as the force T exceeds the other S; then the body A B could turn no longer on the centre of gravity G, (§ 15.) but on another point E, which would be on the other side of the centre of gravity G, with respect to the point of percussion.

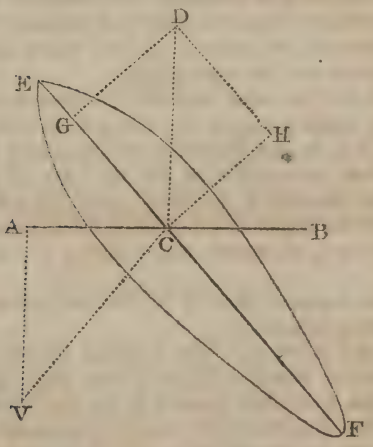
If the body A B (*fig.* 7) were struck at the two points K and F

by two *mobiles*, S and I, exerting equal powers with respect to the centre of gravity G; it is plain that the whole body A B will be carried up on parallels, such as I T and S H, and that the sum of the two powers will act on the centre of gravity G, since they are equal in every respect.

THEOREM.

19. A SAIL ACTS ALWAYS TWO WAYS ON A SHIP, WHEN IT IS NOT PERPENDICULAR TO HER LENGTH.

FIGURE 8.



DEMONSTRATION.

We have only to consider (*fig.* 8,) the sail A B, oblique to the ship and to the wind, and we must be convinced (§ 1, 7.) that it is impelled in the direction C D, with a force expressed by the ratio of the sine of incidence of the wind upon the sail. Therefore, what we are about to observe, for the present case, is to be understood as applicable in all others, in which the sail shall not be perpendicular to the length of the ship; for then, she would go only in the direction of her length from C to E, or from C to F, accordingly as the sail might be full or a-back.

If C D be equal to the impulse of the wind upon the sail, as expressed by the ratio of the sine of incidence A V, we have only to form the right-angled parallelogram G H, to be convinced that such a direction is composed of the two effects C H and C G, which it produces with respect to the body E F, upon which it acts in impelling it in the direction C D.

The more the yard A B (*fig.* 8) shall make the angle A C E acute.

the more the effect C H will augment, and the other C G diminish; for, the more the angle A C E becomes acute, the more its equal, D C H or C D G (§ 22.) will be acute also; so that C D, which is perpendicular to the centre of the yard, will approach more to C H, the other perpendicular to the length of the ship E F; which cannot happen without increasing the ship's tendency to fall off in the direction C H, and increasing likewise the cause C D; which follows, in that increase, the same proportion as the ratio of the sine of incidence. (§ 1, 6, 7.) But this increase of the impulse C D is not sufficient to preserve the effect of the sail in the direction of the keel C G. On the contrary, it diminishes in the proportion of the decrease of the sine A C E or C D G; whence it follows, that you never can augment the impulse of the wind by shifting the situation of the sail, when it is properly trimmed, without lessening the rate of sailing, (§ 28.) when neither the ship changes her course nor the wind shifts.

20. It might, in the same manner, be demonstrated, that the more open the angle A C E of the sail A B is with the keel, the more its effect C G, in the direction of the ship's length, will increase in the same proportion as the increase of the sine of that angle, when the impulse of the wind upon the sail is the same; for, the sines of the angles are in proportion to their opposite sides in the triangle C D G, of which the angle C D G is equal to the angle A C E.

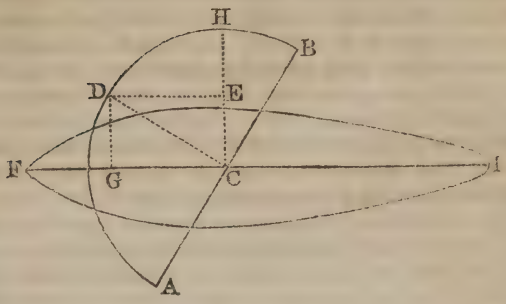
If the impulse augment also, (§ 3.) the two effects, C G and C H, will augment proportionally.

21. If the sail A B receive the impulse of the wind E on its forward surface, it would still act in two ways on the ship; by forcing her in the first place a-stern in the direction C F, and then to leeward in the direction H C: to be convinced of this, reverse the parallelogram, by tracing it on the after part of the yard towards F, and use the same reasoning.

The wind in acting upon a sail renders it concave, and its surface, from obliquity, will be impelled with different degrees of force, in various parts; but the force of the wind, owing to the concavity, will glance along the rest of the sail, being moreover favoured by the angle in which it operates, and will thus derive an additional power.*

* "Savoir, qu'un Bâtiment bon voilier prend une très grande partie de la vitesse du vent. Les parties élémentaires de l'eau sont dures, tenues, infiniment peu susceptibles de condensation: celles de l'aire, au contraire, sont élastiques, et, *se condensant* dans l'espece de cul-de-sac que forme la voile, doivent éprouver beaucoup de peine á se dégager, et user, *en attendant*, de leur *ressort sur la surface concave de la voilure.*" Note de M. Clairbois sur la §20, Ch. 5, du 'Traité d. V.' par F. H. Chapman.—Ed. Paris, 4to. p. 55, 1781.

FIGURE 9.



THEOREM.

22. THE ANGLE A C F, (*fig.* 9,) FORMED BY THE YARD A B AND THE KEEL F C OF THE SHIP, IS EQUAL TO THE ANGLE D C H, COMPREHENDED BETWEEN THE PERPENDICULARS D C TO THE YARD AND E C TO THE KEEL, IN THE LIKE MANNER AS THE ANGLE C D G.

DEMONSTRATION.

The angle A C D is a right one, since C D is perpendicular on A B: the other angle F C E is right also; for C H is perpendicular on F I; therefore the arc A D is equal to the arc F H; and if, from these two equal arcs, be taken the common one F D, the remainders A F and H D will be equal: because, when equals are taken from equals, the remainders must be equal.

23. The angle C D G in the parallelogram G E is alternate to the angle D C E: therefore it is equal to it; therefore it is also equal to A C E.

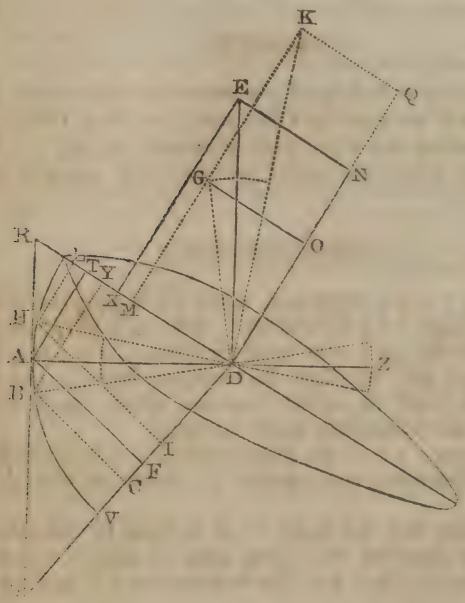
24. It follows, that the angle B C H is equal to the other angle D C F; for, if from the two equal arcs A D and B D be taken the other equal arcs F A and D H, the remainders F D and H B will be equal also.

The few principles of geometry here given, and which will be found of great service in the sequel, ought not to discourage. We only make use of them, in order to establish principles as simple as they are sure; and shall be obliged to employ again a few more demonstrations of this nature, that nothing may be left to doubt or conjecture in the following part of this theory; which is in itself abtruse, but will amply reward the attention of the diligent and effective student.

CHAPTER III.

OF THE MOST ADVANTAGEOUS ANGLE OF THE SAILS WITH THE KEEL AND THE WIND IN ORDER TO OBTAIN THE GREATEST RATE OF SAILING ON AN OBLIQUE COURSE.

FIGURE 10.



25. IN most ships the sails make with the keel an angle A D E (*fig.* 10) of 40 degrees, or thereabout, (some more, some less,) when close-hauled. We are now to undertake to make it appear that this angle is not the most favourable to run with the greatest velocity, in getting to windward. It should be much more oblique; but as it is not possible, in practice, to attain perfection, we must be contented to approach it as nearly as possible, in great ships, by reducing the angle A D E to 30 degrees only. This will be so much the more easily done, as in every ship the two foremost shrouds of each lower mast can be suppressed. For it must be

observed, that in the movement of pitching and rolling, the masts always incline forward, in the direction D E of the effort of the sail; so that the shrouds which are abaft, and cat-harpened in, are sufficient to support the masts, since they act nearly opposite to the effort of the sail. Besides, should there be reason to expect bad weather, preventer-shrouds may easily be fastened to the strops which are always ready hung for that purpose. This practice is so much the better grounded, as the number of those preventers can at any time be increased as circumstances or necessity require.*

Therefore we shall, for the future, consider the angle A D R, which is the most oblique in practice, as fixed at 30 degrees, though in some ships, it may happen to be more acute: a circumstance to which particular attention should be paid.

26. Among the angles A D R, B D R, and H D R, (*fig.* 10,) which the sail A Z can make with the keel in the same course D R, it is evident there must be one more advantageous than the rest, to produce the greatest velocity possible in the most oblique course. That angle of the sail and the keel is not what we propose directly to determine, since it is impossible to render it more acute than 30 degrees, the term to which we have fixed it in practice: but it will serve us to determine, the most favourable angle of incidence A D V W of the wind upon the sail, and which is the most advantageous to run with the greatest rapidity on all oblique courses between close-hauled and wind abaft.

27. Before we enter upon the demonstration of the rule which must be followed in practice, the principle which serves to demonstrate its utility must first be established. It may be recollected that impulsions (§ 7.) are absolutely between themselves as the ratio of the sines of incidence. Therefore, to judge if it is advantageous to render the angle of incidence A D S or A D V of the wind upon the sail A Z more or less acute, we must examine if the sine of incidence A F, or the total impulse D E, increases more or less than the sines of incidence B C and H I, or than their correspondent impulsions D G and D K, proportionally to the diminution or increase of the sines of the angle of obliquity of the sail with the keel A T, B Y, and H L: for if the ratio of the sine of incidence H I, or the impulsion D K, does not increase so much proportionally, as the sine of obliquity A T diminishes in becoming equal to L H, it is evident that the position of the sail A D is more

* This recommendation of M. Bourde, to suppress the two foremost shrouds of each lower mast, in order to brace up sharper, we are warranted in saying, cannot be followed in the British navy. It was lately determined, upon a consultation of the officers of the King's Yards, the question having been referred to them, that the present number and dimensions of the rigging of ships could not be advantageously altered or safely diminished. And, as to occasionally casting them off, it may be rendered, by the inevitable accidents of navigation, highly dangerous; as for instance, in case of being suddenly taken a-back, this lessening of the support of the mast might be attended with its loss.

favourable than when it is situated in the direction D H: and if the sine of incidence B C, or its correspondent impulsion D G, diminishes more in proportion than the sine A T augments, in becoming equal to the other sine of obliquity B Y, in the other position of the sail; it is an evident proof that its situation A D is still more favourable than if it were in the position B D, and that there is even no better situation than A D, whether the angle of incidence A D V be increased or diminished.

28. To prove it, we shall consider (*fig.* 10.) the absolute impulsions D K, D E, and D G, as correspondent with the sines of incidence H I, A F, and B C; then, on those diagonal lines, if we draw the rectangles X N and M O, in order to dissolve those total impulsions D E and D G, it will appear evident that the direct effort D X, in the direction of the keel, is the greatest possible, when the tangent A S of the angle of incidence is double the tangent A R of the angle of obliquity of the sail with the keel; for if the angle of incidence be opened ten degrees, by placing the sail in the situation H D, it will appear that, though the total impulsion D K is augmented in the ratio of the new sine of incidence H I to the first A F, the partial effort D M, in the direction of the keel, will be nearly by one-tenth less, in this situation of the sail H D, than in the first A D. The direct impulsions D M, proceeding from the total ones D K and D G, are equal, because these last have augmented or diminished in the same ratio as the sines H L and B Y have lessened or increased in proportion to the sine of incidence A F, and to the sine of obliquity A T. These direct partial impulsions D M and D X are in a compounded ratio of the sines of obliquity H L, A T, B Y equal, (§ 22.) to those of the angles D K M, D E X, D G M, and of the total impulsions D K, D E, and D G; for if the total impulsion augment by a movement of the sail, the sine of obliquity diminishes: so that from the total impulsions can at any time be deduced those, direct for every possible angle of incidence. We might very well verify this by calculation, which proves that the tangent A S of the angle of incidence must always be double the tangent A R of the angle formed between the sail and the keel, agreeably to the situation of the sail A Z; since, if any other position be given to it with respect to the wind V, whether it be in the direction H D ten degrees more open than A Z, or like B D, 10 degrees more oblique, a result, as D M, in the direction of the keel, will ever be found less than D X.

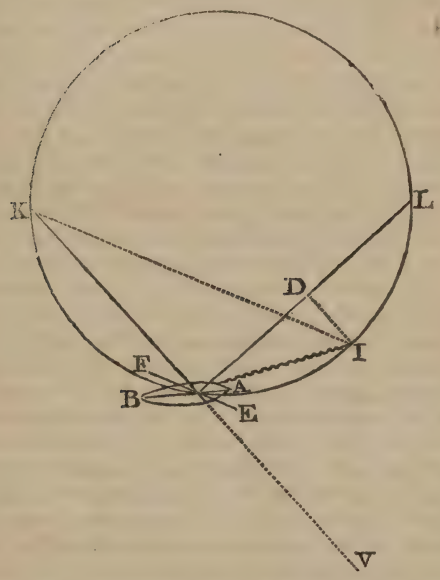
As the vanes always indicate the apparent direction of the wind, on all courses the ship can sail, the angle which the wind makes with the course, or the keel, cannot fail being easily known if there is no lee-way; let that angle with the sails be parted into two others, so that the angle of obliquity of the sails with the course may have its tangent equal to half the tangent of the apparent angle of incidence of the wind upon the sails. On this foundation, it will be easy to form a table which will always show both the apparent angle of incidence, and that of the obliquity of the sail with the keel or with the course. This table will serve for all oblique courses, pro-

vided the after sails cover those forward only in a trifling degree ; for, should they becalm them much, they must, for other considerations, be braced up a little more to the windward ; but always leave the apparent angle of incidence of the wind upon the sail more open than that between the sail and the keel, or the course.

ARTICLE I.

REMARKS ON SAILING BY THE WIND.

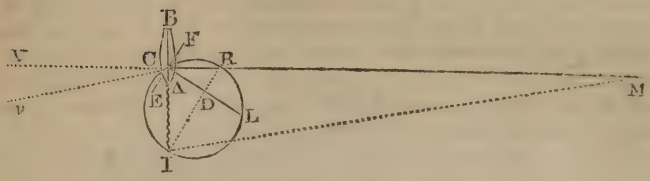
FIGURE 11.



29. When it is desired to gain to windward as much as possible, without absolutely wishing to sail with the greatest velocity. let the direction of the coast under the lee be supposed to make with the absolute direction of the wind (which must as near as possible be known) an angle of 90 degrees ; or, in the sea phrase, *blowing dead on shore* : let the angle A C E, (*fig.* 11,) formed by the sail and the keel, be known to be 30 degrees, let the lee-way be also known to be 10 degrees, the angle E C I between the sail and the course will consequently be 40 degrees, which you must take from the total angle V C L 90 degrees ; then there will remain 50 degrees, the half of which, 25 degrees, is to be taken for the absolute angle of incidence V C E, and for its equal I C L ; so that

the ship A B will go 55 degrees from the wind when she is close hauled, and will consequently recede as much as possible from the point D on the coast, the direction of which makes an angle of 90 degrees with the absolute direction of the wind V K.

FIGURE 12.



But, if the situation C L, (*fig.* 12,) of the point D, from which you wish to move, made an obtuse angle V C L, with the positive direction of the wind V M; then the tangent of the apparent angle of incidence V C E must be made double the angle of obliquity E C I which the sail makes with the course, at the same time that the angle I C L of the course and the coast shall be made equal to the angle V C E, formed by the real direction of the wind V K and of the sail F E: so that two considerations must be at once attended. For example: the angle A C E, formed by the sail and the keel, is 30 degrees; then, according to the first principle, it will be necessary that the apparent angle of incidence V C E should be 49° 6′; and if the difference between the apparent and real direction of the wind be 10°, there will be 59° 6′ for the angle which the sail E F makes with the real direction of the wind V M: so that the angle L C I, of the course and the object stood from, must be found also to be 59° 6′ and the total angle L C V will then be 148° 12′, adhering to the two principles of sailing with the greatest velocity, and of getting to windward of the point D, as much as possible, at the same time; while the angle L C V, formed by the apparent direction of the wind and that of the coast from which the ship moves, will be only 138° 12′. The yawing and the different velocities of the ship render the angle formed by the two directions of the wind (the real and the apparent) more or less open. If the ship has more velocity at the same time, or if the course approaches more to the direction of the wind, it will appear by the vanes that the wind draws forward, and the angle of the two directions of the wind will augment. If the ship falls off, and yet still preserves the same velocity, or if her velocity decreases without altering her course, the wind will seem by the vanes to draw aft, and the angle of the two directions will diminish; so that, whenever the ship shall have velocity or run obliquely to the wind, there will always be a difference between its

real and its apparent direction. If the ship run exactly before the wind, or have no motion at all, there will be then no other but the real direction of the wind shown by the vanes: but, in oblique courses, the vanes, being moveable, will fix themselves in a middle direction between the absolute tendency of the wind and the course of the ship; whence we may easily conclude, as we did before, that the apparent direction of the wind, shown by the vanes, is a medium between the respective velocities of the ship and of the wind; since that direction necessarily partakes more of the greater velocity than of the less: so that, if the ship runs east, with the wind at south, having the fourth part of the velocity of the wind, the vanes will show S. S. E. 4° 30′ S. for the apparent direction of the wind.

ARTICLE II.

A TABLE OF THE SITUATION OF THE SAILS TO RUN WITH THE GREATEST VELOCITY.

M. BOUGUER.

Angles of the apparent direction of the wind and course.		Angles of the sails with the keel.		Angles of apparent incidence of the wind on the sails.	
D.	M.	D.	M.	D.	M.
180	00	90	00	90	00
176	15	87	30	88	45
174	37	86	25	88	12
172	30	85	00	87	30
168	44	82	30	86	14
164	58	80	00	84	58
161	10	77	30	83	40
157	22	75	00	82	20
153	33	72	30	81	03
149	41	70	00	79	41
145	48	67	30	78	18
141	53	65	00	76	53
137	55	62	30	75	25
133	54	60	00	73	54
129	50	57	30	72	20
125	42	55	00	70	42
121	31	52	30	66	01
117	14	50	00	67	14
112	53	47	30	65	23
108	26	45	00	63	26
a	.....	.....	.....	.....	*b*
103	53	42	30	61	23
99	13	40	00	59	13
94	25	37	30	56	55
89	28	35	00	54	28
84	23	32	30	51	53
79	06	30	00	49	06
73	39	27	30	46	09
68	00	25	00	43	00

The foregoing TABLE can be of no great service, except in the eight last circumstances under the line a, b; because, in all the cases mentioned above that line, the sails will cover one another too much.

When a fast-sailing ship, (such as will, on a direct course, or right before it, take a third or a fourth part of the velocity of the wind) comes to run with the same quantity, or more sail, on a perpendicular to the apparent direction of the wind, then she acquires a greater rapidity of sailing with respect to the velocity of the wind; the angle made by the two directions, the apparent and the absolute, is at that time very considerable; it may be from 18° to 22° 30′; and if the ship hauls quite close by the wind, the angle will still be nearly the same; for, her velocity diminishes: but, as it is in sailing by the wind that it is most essential to know the greatness of the angle between the two directions of the wind, let the angle between the directions of the ship's head on the different tacks be observed, without paying any regard to the leeway, but just to the exact point on which the ship stands, before and after going about, when strictly by the wind, neither too much to leeward nor to windward; and, when you have determined that angle, from two or three observations, halve it, and then you will have the angle formed by the keel and the absolute direction of the wind; by which you will know the quantity she will come to upon the different tacks, and will never be deceived with respect to the lying on after having gone about: a mistake which is commonly made by those who pay attention only to the apparent direction of the wind, which always makes with the real one an angle more or less open in a compound ratio of the greatest velocity with the greatest obliquity of the course of the ship, with respect to the direction and the absolute velocity of the wind; things which vary in all ships, because they have not all the same advantage of sailing with the same rapidity in similar circumstances.

ARTICLE III.

Admitting (*fig.* 12) that the velocities are continually proportional to the sines (whatever they be) of the angles V C E, which the sail makes with the absolute direction of the wind, provided the sail be always trimmed in the same manner with respect to the keel, and that, in the triangle C I K, the side C K and the angle C I K are constant, and the velocities of sailing C I are proportional to the sine of the angle C K I, equal to the angle of incidence V C E; it follows, that all the other conditions being the same, the more the sine of the angle V C E is augmented, the greater will the rate of sailing be; so that, if you want to carry it to the greatest rapidity, you have only to make a right angle of the angle V C E formed by the absolute or real direction of the wind with the sail; then the velocity C I will no longer be a simple chord in the circle C K I, but a diametre. This holds good for all the ships which have but one sail set; but, whenever they shall have several, the greatest velocity will be

when the apparent angle of incidence of the wind upon the sail makes a right angle with the course; because then the sails will easily make with the apparent wind, an angle, of which the tangent will be double that of the angle they make with the course, without their becalming one another; while, at the same time, the ship will receive all the absolute impulse of the wind, because she does not recede from it, and it is the time when the greatest surface of sail is exposed to its impulse. The same advantage of the greatest velocity will still be had, when the apparent direction of the wind makes an angle of a hundred degrees with the course; and, in this situation, the velocity will in some degree be increased. In a word, whenever the after-sails do not becalm those forward, the ship's rapidity may always be increased, by trimming the sails as directed (n. 28): but when the sails take the wind from one another, an increase of velocity can no longer be pretended to.

We are now going to demonstrate the exactness of the rule given before. (§ 29.) When it is required to get off shore, or recede from a given right line with all possible expedition, or to keep absolutely as close to the wind as the ship will lie; C M (*fig.* 12) is the absolute direction of the wind; the circle C K L I marks all the points at which the ship can arrive with the same sail, the same disposition, without alteration of lee-way, and at the same time; and C L is the right line from which she is to move. Knowing the angle that line makes with the absolute direction of the wind V M, it is evident that the point I of the circumference, where the course ought to end, is in the middle of the arc C I L, of which C L is the chord: and all the points from one part to the other of C I, where the ship can come to at the same time, are less distant from C L, since D I, perpendicular to C L, divides it into two equal parts, and is the longest of all the perpendiculars which can be drawn from the circumference C I L; but the point I cannot be taken without rendering the angle L C I equal to the angle C K I, which itself is equal to the angle V C E.

CHAPTER IV.

OF THE SAILS WHICH ARE BEFORE THE CENTRE OF GRAVITY OF A SHIP.

30. THE sails which are before the centre of gravity of a ship are the sprit-sail, sprit-sail top-sail, the jib, the fore-top-mast staysail, and the fore-stay-sail.

Besides these sails, there are, on the foremast, the foresail, foretopsail, fore-topgallant-sail, and fore-topgallant-royal-sail, with

their respective studding-sails. Now these four last sails may be regarded as only one large sail, wide at the foot and tapering towards the head, and which can be reduced, as occasion requires, either by taking in the royal, or by reefing the fore-topsail, or even taking it quite in, if necessary, to have the foresail only set; or by hauling the foresail up, if nothing but the topsail is wanted. It must notwithstanding be observed, that the different parts of the whole sail may, in certain cases be worked differently the one from the other; as, for example, in reefing the top-sail, or in taking in either the one or the other. But, when you want to set them to work all together, either for making a course, or performing the same evolution, they must all be braced and trimmed in the same form, and with the greatest uniformity possible. Therefore, whatever we shall say concerning one of them in any operation, is to be understood to be the same with respect to all the rest.

The main-stay-sail, the main-top-mast-stay-sail, the middle-stay-sail, and the main-topgallant stay-sail, are likewise sails of the fore-part of the ship's centre of gravity.

ARTICLE I.

OF THE EFFECT OF THE FORE-AND-AFT SAILS, WHICH ARE ON THE FORE PART OF THE CENTRE OF GRAVITY OF A SHIP.

31. The jib and stay-sails being of a triangular figure, their centre of gravity is easily found; and that point is to be considered as the part, in all these sails, on which the whole effort of the wind is united, when they are exposed to its impulse, in whatever way it strikes them.

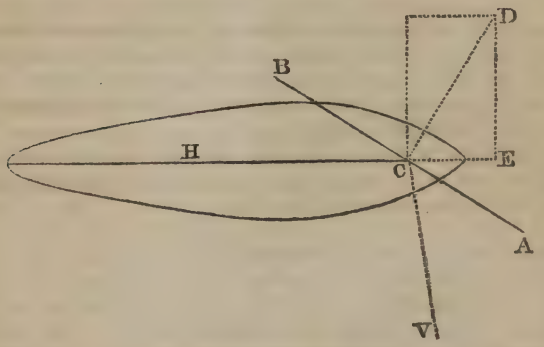
The particular effort of each fore-and-aft sail being on the fore part of the centre of gravity of the ship, it follows that the total effort of all these sails must be there too; and that, if the ship was in a perfect equilibrium with respect to the wind, before her sails were set, she will lose it immediately after (§ 11.) they make the fore part of the ship obey the wind, whenever it strikes them perpendicularly or obliquely. For, it must be observed, that almost all these sails have their tacks in the middle of the ship, and their sheets lead to the sides; so that they make with the keel a very acute angle: whence it is easy to conceive, that the perpendicular which would be raised on the exterior surface of these sails, in the direction of their efforts to leeward, from their centre of gravity, would differ but very little in the lateral direction from a perpendicular to the keel. From this, we may therefore conclude that these sails would have but very little effect, to accelerate the rapidity of sailing with respect to their position, if it was not demonstrated that they are very advantageous in going by the wind. They make the ship steer

well, and are particularly useful when a ship gripes much: and when they do not take the wind out of any of the lower sails, they ought to be used, particularly when one is obliged to sail by the wind, or to run not very large. The jib and fore-top-mast stay-sail must be preferred, because they are at all times useful when they can receive the wind; for, by their position, they cannot take the wind out of any of the other sails, and their particular effect in veering is considerable, not only on account of their great surface, but because they act before the point on which the ship turns with a very long arm of a lever. (§ 17.) Besides, all sails, which raise a ship's head, assist her progress: for the direction of their effort ascending obliquely towards the horizon, they do not make her plunge in the water, which is an advantage peculiar to these sails. Experience has confirmed their utility on all occasions when they can be employed without taking the wind out of the other sails.

ARTICLE II.

OF THE EFFECT OF THE FORE-SAIL, FORE-TOP-SAIL, FORE-TOP-GALLANT-SAIL, AND SPRIT-SAIL, IN THEIR DIFFERENT SITUATIONS.

FIGURE 13.

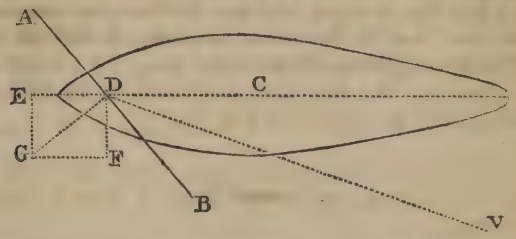


32. When the sail A B (*fig.* 13) is trimmed close to the wind which blows from the point V, it is impelled in the direction C D (§ 7.) with a force expressed by the ratio of the sine of incidence, and composed of the two effects C E and E D. (§ 19.) But, as the centre of effort of that sail A B is on the fore part of the centre of gravity of the ship H, and as its power C D is always composed between those two effects C E and E D, it follows that, the effect of this sail is to cause the ship to bear away; while it keeps up at the same time, and even augments, the rapidity of sailing.

33. If the fore-sail A B received the impulse of the wind perpendicularly, it would still produce the effects of bearing away and augmenting the rate of sailing, for the reasons just given above but more effectually would it do so (§ 29.) on account of the increase of the impulse of the wind upon the sail.

34. It follows, from what has been said, that when the sails upon the fore-mast are full, on the same side they are tacked, being braced obliquely to the keel, there is always one part of their effort, in proportion to the obliquity, which acts to make the ship bear away ; while the other part of their effort acts at the same time to accelerate or keep up the rate of her sailing.

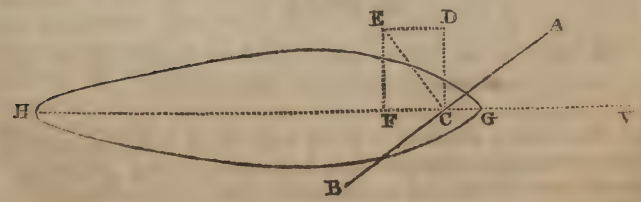
FIGURE 14.



35. When the sails A B of the fore-mast (*fig.* 14) are situated obliquely with respect to the keel, and receive the wind in them, on the side of the sheet B, they act upon the ship in bringing her up to the wind, because their effort D G being composed as usual, the lateral part D F carries the fore part of the ship towards the source of the wind V, in carrying her from D to F.

36. In general, when the yards are square or perpendicular to the keel, it is evident that they will act on the ship, only by impelling her right in the direction of the keel, from stern to head, or from head to stern, with more velocity, in proportion to the impulse of the fluid which strikes them.

FIGURE 15.



37. When the sails A B on the fore-mast (*fig.* 15) receive the impulse of the wind V on their surfaces forward, they will make

the ship both go a-stern and fall of; because the direction C E of their effort, being turned towards the after-part, serves as a diagonal to the parallelogram F D; and being de-compounded, will show us those two effects C F and C D; the first of which takes its direction with that of the keel from forward aft, while the second takes it in a lateral direction in making the ship to turn.

38. When the wind blows between the keel and the yard, the ship comes to, until the point G (*fig.* 15) is in the direction of the wind V. But, as soon as this is done, it is evident that she falls off; for the point G recedes farther and farther from the direction of the wind. Whence we may remark, that, as soon as the weather-part of the sail catches a-back, on the tack side, the angle of incidence of the wind on it goes continually increasing, till the ship has fallen off so much, that her sail becomes perpendicular to its direction: and, if the vessel continues to fall off, then the angle of incidence diminishes more and more, till the sail is parallel to the course of the wind which comes from the tack B, or, as it is called, *shivering*.

CHAPTER V.

OF THE SAILS WHICH ARE ABAFT THE CENTRE OF GRAVITY OF A SHIP.

39. THE main-sail, main-top-sail, main-top-gallant-sail, main top-gallant-royal-sail, and their respective studding-sails; the mizen-stay-sail mizen-top-mast-stay-sail, the mizen course, mizen-top-sail, mizen-top-gallant-sail, and mizen-top-gallant-royal-sail; are all sails which are placed abaft the centre of gravity of a ship, the point round which the total effort of the sails is placed.

ARTICLE I.

OF THE EFFECT OF THE FORE-AND-AFT SAILS ABAFT THE CENTRE OF GRAVITY OF A SHIP.

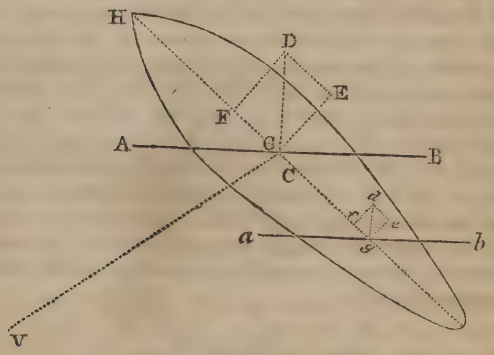
40. The centre of effort of these sails being abaft the centre of gravity of the ship, it follows that they always force the afterpart of the ship to leeward, and consequently contribute to bring her to the wind as soon as they receive its impulse; for, that movement of the after-part of the ship cannot happen, without the head approaching to the direction of the wind.

The fore-and-aft sails being in general situated very obliquely, it follows, consistently with principles, that they are very advantageous for sailing by the wind. Therefore, we must not neglect augmenting them: observing, at the same time, that they do not take the wind out of one another, nor becalm the principal sails. They are only to fill up the space between the masts fore and aft, in sailing near the wind, in order that no wind may be lost.

ARTICLE II.

OF THE EFFECT OF THE SQUARE SAILS OF THE MAIN-MAST, AND OF THE MIZEN-TOP-SAIL, IN THEIR DIFFERENT OBLIQUITIES.

FIGURE 16.

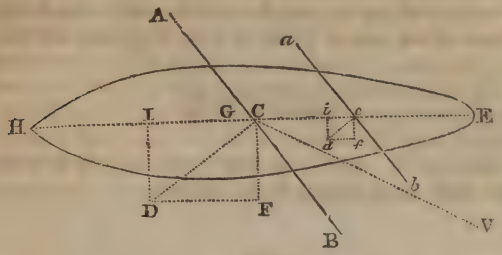


41. As we have already demonstrated (§ 19.) that when the sail A B (*fig.* 16) is trimmed obliquely to the keel, it produces evidently two effects on the ship; it must therefore follow, that, in dissolving its power C D, we shall find its compound effects, the one C F, in the direction of the keel which produces the velocity, and the other C E lateral, which (in forcing the after-part of the ship to leeward, by its action on the point C abaft the centre of gravity G of the ship) occasions her to come to the wind; for that motion of the stern from C to E cannot take place unless the fore-part H acts contrarily in coming towards the point from which the wind blows, V.

42. If the sails A B were more or less oblique to the keel, they would still have the same effect of keeping up the ship's velocity, and bringing her to the wind. And, if they receive its impulse perpendicularly, it would still be the same thing, producing those two effects, however, with greater efficacy than in any other

situation with respect to the wind, because then they receive its greatest possible impulse for the time.

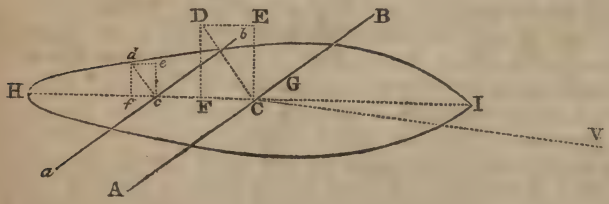
FIGURE 17.



43. When the sails A B (*fig.* 17) of which the centre of effort C is abaft the centre of gravity of the ship, receive the impulse of the wind V on the sheet side, being placed obliquely to the keel, they will cause the ship to fall off, by forcing the after-part, from C to F, towards V, the source of the wind, while they will, at the same time, keep up the velocity C I. For, this motion of the after part E towards V cannot be executed without the fore-part H going, as it moves off, in a contrary direction; and she will continue to fall off till the keel E H be right in the direction of the wind V C, or right aft; then the ship will come to the wind, as shown in the two preceding articles.

It may be remarked that, in this movement of the ship, the angle of incidence goes continually increasing till the wind is perpendicular to the sails.

FIGURE 18.



44. When the sail A B, (*fig.* 18) of which the centre of effort is abaft the centre of gravity G, shall receive the impulse of the wind V on their forward surfaces, they will make the ship come to the wind and go a-stern at the same time. For the direction of their efforts C D may be dissolved between the two efforts C F, in the direction of the keel, from forward to aft, and C E lateral and perpendicular to the keel; so that the after-part C H is forced to

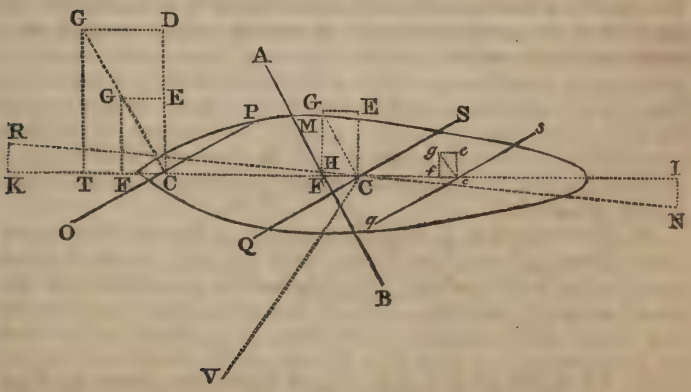
leeward from C to E, while the fore-part I approaches, by a contrary motion, the point of the wind V. In this case, therefore, the ship comes to, and goes a stern.

45. When the ship is so far come to the wind, that the fore-part I (*fig.* 18) has come into its direction, it is evident that she will fall off more and more; for that point I will constantly move from the point of the wind V; therefore, it is demonstrated that, in this case, the sine of incidence is continually decreasing more and more, till it is reduced to nothing. But, if the direction of the wind had made an obtuse angle V B C, the sine of incidence would have augmented until the direction of the wind had been perpendicular to the sails; and it is at that moment only it would have begun to diminish, as we have shown before.

CHAPTER VI.

OF THE EQUILIBRIUM NECESSARY TO BE KEPT IN PRACTICE, BETWEEN THE SAILS BEFORE AND ABAFT THE CENTRE OF GRAVITY OF A SHIP, IN ORDER THAT THE SAILING MAY BE THE MOST DIRECT AND THE MOST RAPID.

FIGURE 19.



46. AFTER having demonstrated the different effects of the sails both before and abaft the centre of gravity, it is clear that if either the head or after sails only were set, in sailing by the wind, the ship would not only steer badly, but consequently sail not so fast as she could under the same quantity of surface differently

disposed. For, if the ship be supposed (*fig.* 19) to be under her head-sails, and one half be taken in and set on the masts abaft, it will evidently appear that the velocity they produced, C T, is the same, since the direction and the velocity of the wind act always in the same manner on the same quantity of surfaces; the only difference which will be found is that, the primitive effect is divided, and acts now on the points C, C, E, before and abaft the centre of gravity of the ship. It is not the same with respect to the effect C D, which acted only on the head of the vessel in the first disposition of the sails; because, that effect being now divided on the after-masts, it is diminished one-half C E forward, by reason of that force being transported aft; where, balancing the effect of falling-off produced by the head-sails, it keeps the ship to the wind; by equality in the movements (§ 34 and 42.) we say that it *balances*, because, when the weather permits, we may at any time either increase or diminish the sails, so as to preserve an equilibrium between their powers, and fix the ship on her course. When this point of equilibrium is obtained, we then possess the most advantageous disposition the sails can have for the vessel to run with the greatest celerity; provided that they have been trimmed in the most favourable manner to receive (§ 28.) the greatest impulse of the wind.

This equilibrium between the powers of the sails forward and aft is likewise advantageous with respect to the rudder; because, as there is less occasion to use it to regulate the movements of the ship, its surface opposes itself but little, and less often to the shock of the water, which glides along the ship's bottom. It is then of the greatest importance, in endeavouring to increase the ship's way, to combine as much as possible, the reciprocal effect of the sails fore and aft; either in setting them to the wind or in disposing more advantageously, forward or abaft, a greater or a less quantity of sails according as the ship is more or less inclined to fall off or come to, in order to make as little use of the helm as possible; the whole power of which, however, at the time of performing any evolution, must be put in action, as we shall make appear hereafter.

47. When there is an equilibrium between the sails fore and aft, the resistance of the water from A to B (*fig.* 19) on the bows is equal to the power of the sails, whether it passes through the centre of gravity H of the ship, or through another point of the axis, more or less forward or aft; then a ship, thus situated, finds no more difficulty to veer than to come to the wind, with respect to the resistance of the water under her lee; since all things are equal, viz: the resistance of the water upon the bottom to leeward, and the impulse of the wind upon the sails. But it must be considered that the power, composed of those of all the sails united, acts upon the ship according to the direction B A, perpendicular to their surfaces, the origin of which is the point H, a middle between all the effects C G of the sails fore and aft, which ought to

correspond exactly with the resistance of the water from A to B: so that the ship is pushed to leeward of the course I K, which she holds into the direction B A of the effort of her sails; but the resistance which she finds from the water on the lee-side of her bottom, from A to B, sets her right again by its opposition; which is greater by reason of the superior facility she finds in dividing the fluid with her stem than with her side: so that she runs on the true course N R, which approaches nearer to that on which she steers than B A. Therefore the angle K H R of the lee-way is proportional to the greater or lesser resistance the ship finds laterally from the fluid under her lee; which resistance depends entirely on the more or less facility she finds in dividing the water with her bows; so that the lee-way can never be considerable but when close-hauled; for this reason, it is not much taken notice of when the course is less oblique than the wind on the beam. We might pursue this reasoning still farther, from an experienced fact, which will prove that the lee-way depends, not only on the form of vessels, but still more on their greater or lesser velocity, and seldom or never on the entire disposition of their sails more or less oblique to the keel, as some authors have advanced. For, when a fine-sailing vessel is trimmed sharp, with all her sails set, in a very light breeze, with which she scarcely obeys the rudder, the lee-way is considerable, though the sea be perfectly smooth. This great lee-way is made by the ship, because the vessel being only gently impelled, and with little force, the water, not being shocked with violence, offers little resistance, and she is then carried easily by her sails in the direction of their effort B A: and, if we consider the side of the ship, in the act of sailing, as presenting a very great surface of sails above the water, it will visibly appear that the lee-way will become still more perpendicular to the keel. But, let the wind begin to freshen, then the rapidity of sailing augments considerably; the ship shocks the water with a force expressed by the ratio, of six or nine knots of velocity from B to A (*fig.* 19) in the space of an hour, while the water repels her effort in a contrary direction: the water then repels in the ratio susceptible between the present and the former velocity, and now no longer yields with facility (§ 4.); the lee-way is suddenly diminished, and is reduced to five or six degrees, and sometimes less, if the rapidity of sailing continues to increase; if, at the very time when the ship has acquired already a very great velocity, she be kept away 12° or 15°, or even 20° 30′, without altering the sails, their obliquity remaining the same, the ship should then fall off in the same proportion, according to the opinion of some who have written on the theory of the working of ships. This, notwithstanding, never happens; the velocity augments, because the sails then receive the wind with a greater sine of incidence, and thereby acquire more power, while the bows continue to be still shocked by the fluid in the same parts, and with the same sine of incidence; so that the lee-way diminishes again, because the water makes a

greater resistance from the increase of velocity; and that resistance is greater on the ship's side than on her bows, which is less exposed to the shock. Whence it must be concluded that the lee-way, in the same ship, does not depend alone on the disposition of her sails, and that in different ships it is always dissimilar, from their not having the same form, or their sails not trimming equally in the same oblique courses; and because, in short, they have different velocities with the same weather and under the same sails. Which proves, in a word, that the lee-way is always in a proportion compounded of the velocity of the ship; of her form, which gives her more or less resistance on her side than on the bows; and of her sails, trimmed more or less obliquely.

To return to the consideration of the action of the water on the bottom from A to B, (*fig.* 19) it must be remarked that it acts forward; and that it must consequently contribute very much to the tendency which almost all ships have to come to the wind, whenever the after-sails are in the smallest degree more powerful than those forward: for, the shock of the water is then a power which is to be added to that of the impulse of the after-sails, since this action of the fluid is so much the stronger as it acts before the centre of gravity of the ship at the point M, (*fig.* 19) in impelling the fore-part towards the wind, which always makes ships difficult to ware, because all the effort A B of the water's resistance upon the bows is opposed to this movement, in forcing this part to windward with a very great effort. It is not therefore to be wondered at when ships veer with difficulty or slowly, especially such as have a large cut-water; because there are two forces acting one against the other, and the force which comes from the sail must surmount (§ 18.) that which comes from the water; which will always easily happen, whenever, in suppressing some of the aftersails, those forwards shall be favourably enough disposed to produce that effect, and when the rudder is used at the same time; the power of which is considerable, whether the ship goes a-head or a-stern rapidly. But if the ship, being abandoned to her own motion in an oblique course, had on a sudden all her sails suppressed, the vessel would come to the wind, even should the rudder be never used; because the water, acting on the fore-part of her bottom more on one side than the other, impels the head to windward against the smaller resistance, until its power is entirely destroyed by the total cessation of the ship's velocity.

When the ship runs so large that the after-sails becalm part of those forward, this is another reason for the ship having an inclination to come to the wind; for, the sails forward receive a much less impule from the wind than in a course more oblique; because the sails abaft, by increasing in their power, prevent those forward from having as much wind as their surfaces would take, since all the lee-parts of these sails become useless for the moment, being becalmed by the weather-part of those on the main-

mast; so that the power of the sails forward diminishes, while that of the after-sails increases; for the sine of incidence is greater. The ship ought then, for these reasons, to have more inclination to come to the wind; but, regard must be paid to the direction of the power of the sails in general, which now approaches nearer the direction of the keel: so that the greatest part of their effort is in that direction, while their force in the lateral one diminishes.

It should be farther observed, that when the ship has as much sail as the weather will permit her to carry, this is the moment of the greatest velocity of sailing, provided that (the sails having at the same time received the most favourable disposition) an exact equilibrium has also been placed between those afore and those aft, so that there should be little occasion for the use of the rudder.

APPLICATION.

48. One may readily discover, from what precedes, how to distinguish the degree of quickness with which different operations ought to be performed. For example, being obliged to run for a road-stead, the wind being large, and to let go an anchor as soon as come to it, it is evident this ought to be executed but under little sail, which should be all on the part before the centre of gravity; because, in the first place, a ship has always velocity enough when she sails large; secondly, because she is to overcome the effort A B (*fig.* 19) of the water which opposes her motion. If, on the contrary, obliged to come to the wind in anchoring, as many sails as can conveniently be managed at that moment may be set, because this movement of the ship is always very quick, and as soon as the sails are taken a-back, the rapidity of the ship's way diminishes, and in a few moments entirely ceases, whereas it always augments when the ship falls off.

ARTICLE I.

REMARKS ON THE EFFECT OF THE MAIN-SAIL.

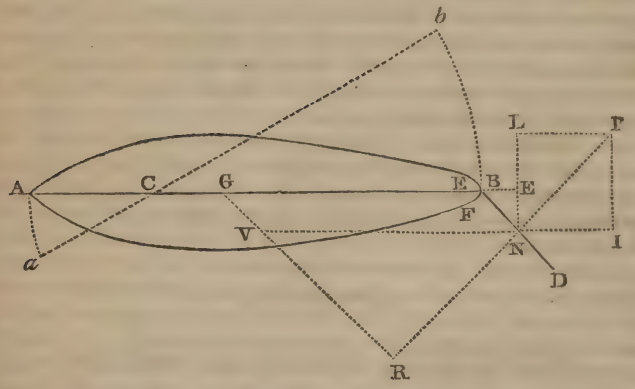
49. In the use of the sails, attention should be paid to the effect of the main-sail, which perhaps may not be that of bringing the ship to the wind; for, if the ship be too much loaded a-stern, the centre of gravity H (*fig.* 19) of the ship might be abaft the main-mast, and then the direction of the effort of that sail, quitting the point C before the centre of gravity, ought to make the ship fall off in lieu of keeping her up to the wind. But, for this to happen, the ship must be either very ill constructed or very badly loaded; or, in short, there must be great error in the position of her masts.

Notwithstanding the main-sail may always be made to assist the ship in veering, though the centre of gravity H be (as it is almost always) before the effort C of the main-sail; yet, to do it, the effect of that sail needs only to be changed, by making it pass before the centre of gravity of the ship: which will suddenly happen, if when close-hauled, the main sheet be let go a-main; because the weather part of the sail being fixed forward by the tack, its effect is likewise before the centre of gravity of the ship, though it has lost in that part much of its power, in becoming less exposed to the impulse of the wind; while the lee-part, bellying out more, can receive a great impulsion of the wind, which will strike it more and more perpendicularly as the ship falls off with more and more rapidity. In this case, it may happen that, if the direction of the effort C G of the main-sail do not pass before the centre of gravity H of the ship, it comes so near that point, that it may be said to have no longer the effect of an after-sail.

ARTICLE II.

OF THE RUDDER.

FIGURE 20.



50. The rudder is a machine known to all the marine world: it is supported by the stern-post, to which it is affixed by braces and pintles, which operate as hinges. It acts by means of a lever, called a tiller, which enters almost horizontally into the ship, passing under the upper or middle deck transom; so that if, instead of leaving the rudder exactly in a right line with the keel, and as it were a prolongation of it, it be turned to one side or the other, as B D, (*fig.* 20,) it receives an immediate shock from the water which glides along the ship's bottom, in running aft from A

to B ; and this fluid impels it towards the opposite side, while it continues in that situation, so that the stern, to which the rudder is confined, receives the same movement ; and, the ship receiving an impulse sideways, her stern turns accordingly from B to *b*, on any point whatever C, (§ 18.) while her head passes from A to *a*. It must be observed, that the water strikes the rudder obliquely, and only with that part of its motion which acts according to the sine of incidence, in impelling it in the direction N P with a force which depends not only on the rapidity of sailing, but also on the greatness of the sine of incidence : a force which is consequently in the compound ratio of the greater or lesser velocity of the ship's motion, and of the larger or smaller sine of incidence, which depends upon various circumstances. This impulsion, or, what is the same, the power of the helm, is always very feeble, when it is compared with the whole weight of the vessel ; but it acts with a very long arm of a lever, which occasions it to work very advantageously in turning the ship ; for the helm is fixed at a very great distance from the centre of gravity G, as well as from the point C, upon which the ship is supposed to turn, with respect to the point of percussion B : and, if the direction P N of the impression of the water upon the rudder be prolonged, it is evident that it will pass perpendicularly at the point R, widely distant from the centre of gravity G ; therefore the absolute effort of the water is very powerful. It is not therefore surprising, that this machine impresses the ship with a considerable circular movement, by forcing the stern from B to *b*, and the head from A to *a*, and even much farther, when the velocity of the ship is preserved ; because the effect of the helm always keeps pace with the rapidity of the ship's way.

51. Amongst all the obliquities which may be given to the rudder, there is one situation which is more favourable than any of the others, to make it produce with more rapidity the effect of turning the ship, in order to change her course. To be convinced of this, we have only to consider that, if the obtuse angle A B D (*fig.* 20) were to be lessened, the impulse of the water on the rudder would augment, at the same time that it would more oppose the sailing of the ship, since the angle of incidence would be more open, and would present a greater surface (§ 7.) to the shock of the water, by opposing its passage more perpendicularly ; but then the direction N P of the effort of the helm upon the ship would pass at a smaller distance from the centre of gravity G towards R, and would less approach the perpendicular N L, according to which, it is absolutely necessary that the power should act with greater effect to turn the ship. Therefore, it is evident, that if the obtuse angle A B D were too much lessened, the greater shock of the water could not counterbalance the loss occasioned by the distance between the direction N P and N L, or by the great obliquity which would be given to the same direction N P of the absolute effort of the helm with the keel A B. If, on the other

hand, the angle A B D were made more obtuse, the direction N F of the effort of the rudder would become more advantageous to turn the ship, since it would approach more the perpendicular N L, and since the prolongation of N P would augment G R, by passing at a greater distance from the centre of gravity G. But the rudder would then be struck too obliquely : for the angle of incidence would be more acute ; so that it would only present a small part of its breadth to the shock of the water, and would, of course, receive but a faint impulsion. All this proves that the greatest distance G R from the centre of gravity G will not counterbalance the too great obliquity of the shock of the water.— Whence it must be concluded that, when the water strikes the rudder too obliquely, or too perpendicularly, a great deal of the impulsion, or of the effect it should produce, is lost. Therefore, between these two extremes, there is a middle position, which must be the most favourable.

52. The diagonal N P of the rectangle I L (*fig.* 20) represents the absolute direction of the effort of the water upon the rudder : N I expresses the portion of this effort which opposes the ship's head-way, or which forces her a-stern in the direction of the keel. It is easy to perceive that this portion N I of the whole power of the helm contributes little to turn the vessel ; for, if I N were prolonged, it would be seen that its direction passes at a very small distance G V from the centre of gravity G, and that the arm of the *lever B N = G V, to which the force is as it were affixed, is at most equal only to one-half of the breadth of the rudder — But, it is not so with respect to the relative force N L, which acts perpendicularly to the keel. If the first force N I is almost useless, and even hurtful, by retarding the velocity, the second N L is capable of a very great effect, since it is applied at a great distance from the centre of gravity G of the ship, and acts on the arm of the lever G E, which is very long. Thus it appears, that, between the two effects N L and N I, which result from the absolute effort N P, there is one which is always opposing the ship's head-way, contributing but little therefore to the motion of her turning ; whilst the other alone produces that movement of evolution without retarding her velocity.

53. Geometricians have determined the most advantageous angle made by the helm with a line prolonged from the keel, and

* *Explanation of Algebraic terms.*

$=$ *denotes* equality.
$A+B$ *signify* A *added to* B reciprocally.
$A-B$ ..... A *subtracted from* B
AB .... $A \times B$ .... } A *multiplied by* B
$\frac{A}{B}$ and $A \div B$ ..... A *divided by* B
$A\,B \times \overline{B \div C}$ *denote* separately connected terms, by the line —— above $B \div C$

fixed it at 54° 44′, on a presumption that the ship is not wider at her floating-line than at her keel. But, as that supposition is absolutely false, since all vessels augment their breadth from the keel upwards to the extreme breadth where the floating-line, or highest water-line, is terminated; it follows that this angle is too large by a certain number of degrees. For the rudder is shocked by the water, at the height of the floating-line, more perpendicularly than at the keel, since the fluid exactly follows the outlines of the bottom: so that we might almost say, a particular position of the helm might be required for each different sine of incidence upwards from the keel. But, as a middle position may be taken between all those points, we need only consider the angle formed by the sides of the ship and her axis at the load-water-line, in order to determine afterwards the middle point and the middle angle of incidence. It appears, from Mr. Bouguer's *Traité de la Manœuvre*, Sect. I. Liv. II. that, in most ships, the angle of the rudder with the prolonged line of the keel should be made to be 46° 40′. In order that our treatise may produce the desired effect, with the least possible difficulty for the general reader, we shall perhaps, without following the calculations of that able geometrician, be able to explain what he has abstrusely discussed, in a manner better adapted to the comprehension of all.

54. When it is required to turn the ship by means of the rudder, and, at the same time, keeping the head-way as much as possible, it is evident that the angle 54° 44′, which some have determined to be the most favourable with the line of the keel prolonged, is in that case too open; because the water strikes the rudder with too great a sine of incidence, and that is equal to the angle which it makes with the line prolonged from the keel below. Above, the shock of the water is almost perpendicular to the rudder, on account of the width of the ship's sides, as has been shown before. But, if the rudder opposes the fluid by making only with the line prolonged from the keel an angle of 45° 1′, the impulse, by becoming weaker, will be less opposed to the ship's head-way; and the direction N P (*fig.* 20) of the absolute effort of the water on the rudder, approaching nearer to the lateral perpendicular N L, will be more advantageously placed; since the prolongation of the absolute effort passes at a greater distance G R from the centre of gravity G. On the other hand, experience every day shows us that ships steer well, when they do not even make the angle D B E more than 35°. If this angle be made 45°, as we require it, and then we should decompound the absolute effort N P, we have the side N I equal to the other side N L of the same square; so that the part of the total power which opposes the head-way is only equal, in this case, to that which produces the movement of rotation: instead of which, if D B E were 54° 44′, N I would become much greater than N L, in proportion to the sines of the angles which are opposed to them

in the triangles P I N or P L N, and the ship would consequently lose much more of her velocity than in the first situation of the rudder, to which we shall confine ourselves, as being that which is better fitted to the generality of vessels, but which must nevertheless be occasionally altered, according as they shall make an angle more or less open with their sides astern.*

The angle of the rudder with the keel may always be determined with sufficient precision, by observing the rule we have prescribed (§ 28.) for the determination of the angle of the sails.

55. As the water often strikes the rudder with a very great force, the tiller has a certain length, in order to lessen the labour of the helmsman.

But, to lighten his labour still more, there is in most ships, on the quarter-deck, directly over the extremity of the tiller, a vertical wheel (*fig.* 20) which has the effect of a capstan, and which is connected with the tiller by means of ropes and blocks. So that, if the wheel be turned either one way or the other, the extremity of the tiller approaches towards one of the sides of the ship, and exposes the rudder to the shock of the fluid.

56. The longer a lever is, the more effect it has when it acts with the same power: therefore, the longer the spokes of the wheel are, in proportion to the radius of the cylinder round which the tiller-rope is wound, the more advantage the helmsman will have; for, if the spokes of the wheel be three or four times longer than the radius of the cylinder, the helmsman will act with three or four times more force, since he works on a lever which is three or four times longer than the radius of the cylinder, the extremity of which is supposed to be the fulcrum of the lever on which he works. So that if he employs a force of 30 pounds weight, he will produce an effect of 90 or 120 pounds, by the disposition of the wheel alone. On the other hand, the impulse of the water is collected in the middle of the rudder's breadth, which is very narrow, compared with the length of the tiller; therefore, the effort of the water is very little distant from the point of support B upon which it turns: whereas the tiller forms the arm of a lever 10 or 15 times longer which still increases the power of the helmsman in a similar proportion to that which exists between the length of the tiller and that of the lever on which the impulse of the water acts. This force is therefore 10 or 15 times stronger; and the effort of 30 pounds, which before gave the helmsman a power of 90 or 120 pounds, will become one of 900 or 1800 pounds on the rudder. This advantage proceeds from the water's acting on a very short arm of a lever, while the helmsman works on one very powerful, in comparison; and because this lever is moved by a wheel which multiplies its force. This demonstration ought to remove all surprise at the prodigious effect of the

* It may be taken as a general position that the most advantageous angle will always be formed between 35° and 45°.

rudder, when its mechanism is not attended to; for we have only to consider the pressure of the water, which acts at a very great distance from the centre of gravity G of the ship, as well as from the point C upon which she is supposed to turn, (§ 15.) and there will easily be perceived the difference which exists between the effort of the water against the helmsman and the effect of that same impulsion against the ship. With respect to the helmsman, the water acts with the arm of a lever N B very short, of which B is the fulcrum: on the contrary, with respect to the ship, the impulse of the water is exerted in a direction N P, which passes perpendicularly at a very great distance from the centre of gravity G, in acting on a very long lever E G, which renders the action of the rudder very powerful in turning the ship: so that, if in a large ship, the rudder receives an impulse from the water 2700 or 2800 pounds, (as very often happens, provided that the ship sail at the rate of 9 or 12 knots, and that this power, applied at E, be 100 or 110 feet from the centre of gravity G,) it will act upon the vessel, to turn her, with a power equal to 270,000 or 380,000 pounds, while the helmsman need not act with a greater power than 30 pounds on the spokes of the wheel.

57. It is proper to remark, that the great length which is given to the tiller, in order to facilitate the work of the helmsman, is an obstacle to the play of the rudder; since that length hinders it sufficiently presenting itself to the shock of the water to produce all the effect which might attend it. For this inconvenience does not, in most ships, allow the angle D B E (*fig.* 20) to be more open than 30°; whereas it should be 45°, as we have before shown. But, as this most favourable determination has not yet come into use, and the coarse dimensions commonly given to the tiller have always been followed, we shall endeavour to propose something better for practice.

It must be considered, that, if the tiller were shorter, the rudder would have more play, because its extremity, in describing the arc of a smaller circle, would occasion the rudder to make an angle more open, with the keel prolonged: and this new augmentation would be so much the more advantageous, as it would approach nearer to the angle of 45°. And as, in all ships, the length of the tiller might certainly be cut a fifth shorter, or perhaps more, it is evident that, thereby, the angle of the rudder and the keel prolonged might be rendered very near 45°, which would increase its force at least in a proportion of nearly 7 to 5, since the sine of incidence of 45° is to the sine of incidence of 30° : : 7 : 5, or thereabout. This augmentation of the impulse is often of the greatest importance, especially when ships are of a large size, as their motions are but slow on account of their length.

If the tiller be shortened, the helmsman will be obliged to employ more force in proportion to the length taken from the lever on which he works: but this loss may be repaired by the facility

with which the helm will be handled, if the diameter of the cylinder of the wheel be considerably lessened, augmenting at the same time the length of its axis, without diminishing that of the spokes, which ought on the contrary to be lengthened as much as possible, and two more turns of the tiller-rope should be wound round the barrel.

These forces would be still multiplied, if two sheaves were fixed in the end of the tiller, in two mortises which might be made for that purpose, and which might work on an iron pin passing through their centres, taking care to have the end of the tiller stoutly hooped with iron, in order to strengthen it; then the tiller-rope might be reeved through the blocks which are for that purpose on each side of the ship, thence through the two sheaves at the end of the tiller, and the standing-part to be affixed close to the blocks on each side. By these means, nothing would be lost with respect to the force; because, if the lever be shorter, the forces which cause its action, are likewise multiplied in proportion.

58. After what has been said respecting the helm, it is easy to conceive that the greater the ship's velocity is, the more powerful is the action of the rudder, since it acts against the water with a force which increases as the velocity of the fluid, (§ 3.) whether the ship has head-way or stern-way: observing always, that in these two circumstances the effects are contrary; for, if the ship goes astern, the rudder will be struck from I to N; (*fig.* 20;) and, instead of being pushed from N to P, it will be so from N to R: so that, the stern being moved in the same direction, the head will take a contrary one, and move towards the same side as the tiller B F.

59. It should be observed, in the use of the rudder, that there is one part of its effort which impedes the ship's sailing when it is struck by the water which runs rapidly along the ship's bottom. If it makes an angle of 45° with the keel prolonged, it receives only half the impulsion it would if acted upon perpendicularly; because the absolute impulse diminishes from two causes: (§ 7.) The surface which opposes the shock of the water is reduced to a less extent than it was at first, and the angle of incidence diminishes likewise: so that, by this, the impulse has diminished one half, since the sine of 45° is measured by $\sqrt{2}$. Considering next the impulsion N P, which remains, (*fig.* 20) it will appear that there is only one part N I which is opposed to the sailing, (§ 54.) and which is less than N P, in the proportion as the sine total is to the sine of 45°, the measure of the angle of incidence V N B equal to N P I; for the angle V N L is right, as the angle P N B; so that, if, you take away the common angle, L N B, two angles P N L and V N B will remain equal between themselves; but, as the angle I P N is equal to its alternate angle P N L, it follows that I P N is always equal to V N B, whether the angle made by the rudder be more or less open with the keel prolonged. So that, if the surface of the

rudder which receives the shock be 80 feet square superficies, it will first be reduced, by its being exposed to the course of the fluid, to an effort of at most 56 feet surface, then to 40; because, in the first place, there is only one part of the velocity of the water which contributes to the shock, and that is proportional to the relation of the sine total to the sine of incidence; and, secondly, because out of the absolute impulse N P, which results from this last oblique shock, there is only a part N I which opposes the velocity of the ship proportional to the absolute N P, in the same relation as there is between the sine total and the sine of incidence; that is to say, that when the rudder makes, in the largest ships, an angle of 45°, it impedes the ship's rapidity of sailing in the direction of the keel, with an effort N I equivalent to the impulsion which a surface of 40 feet square might receive if it were exposed perpendicularly to the shock of the water.

60. It follows, from all that has been said of the rudder, that it ought to be employed as little as possible; that is to say, the ship and her sails ought to be so disposed, that the smallest motion of this machine may bring her to her course, if she deviates from it, or make her perform any evolution which may be thought proper.

ARTICLE III.

THE TIME EMPLOYED BY DIFFERENT VESSELS TO PERFORM THE SAME EVOLUTION IS PROPORTIONED TO THEIR LENGTHS.

61. All that serves to produce motion in ships has more force in the larger than the smaller; but the difficulty which large ships have to receive the motion is greater, in a greater proportion, than that which opposes the motion of small ships. For, if the dimensions and machines which compose a large vessel are twice as large as those which constitute a small one, (solidities being in ratio of their cubes,) the first will be eight times as great. Yet the obstacle which the large one will oppose to its being put in motion will be two-and-thirty times as great as that of the smaller. For, if both ships were considered as divided into an equal number of vertical sections, those of the large would appear to have four times as much surface as those of the small, besides that they would be twice as thick, since the dimensions are in general twice as large; consequently they will have eight times the solidity; which answers already to the relative effort of the rudder and sails.

Farther, the parts of the large ship are twice as distant from the centre of gravity as those of the small one, since those distances are proportional to the other simple dimensions of the two ships. So that if the evolution be supposed of the same number of degrees, the stern and head of the large ship will have to describe arcs twice as large as the small one; and this greater velocity being multiplied by the solidity of the parts of the large ship, which

is eight times as great as that of the small one, the product will give 16 times more motion ; the resistance will act consequently 16 times as much on the large as on the small ; and as that resistance operates on the arm of a lever twice as long, the total resistance of the large ship will be 32 times as great. Thence it follows that, if the forces which act on the large ship be augmented only in proportion to her solidity, she will have still four times more difficulty than the small one to get into motion : and therefore the large ship, instead of making in the same time an angle of rotation as great as the small one, will only make an angle of one-fourth, or three times less. Now, that the great ship should describe an angle of rotation equal to the other vessel, it will require only thrice as much time : but that angle, or the velocity with which the ship obeys the impulse of her rudder and sails, will follow the laws of acceleration, since the velocity acquired in the first instance is continually augmenting in arithmetical progression ; so that the time which similar vessels, of different sizes, take in performing the same evolution will be in proportion to their lengths. But the heavier body parts with its velocity not so readily as the lighter body, because the resistance of the mass is greater, being three times heavier than that of the small ship ; which, being moved with thrice the facility, is also brought to rest with the same degree of ease. So that, if a vessel 100 feet long takes four minutes to perform an evolution, a similar vessel of 150 will take six minutes or thereabout to perform the same circular movement. For as 100 : 150 : : 4 : 6.

CHAPTER VII.

OF THE HEIGHT OF MASTS.

THE correct height of the masts of ships is still a problem which remains to be solved for the builders. The most skilful of them have not paid attention enough to the solutions and determinations which are contained in the works of the late Mr. Bouguer on that subject. It seems, on the contrary, as if they had endeavoured to deviate as much as possible from the true principles in that respect, by raising the masts a great deal more than they were formerly, although they were already much too high, as the learned author I have just mentioned has asserted.—Experience, confirmed by repeated observations, has convinced me of this truth ; viz. that, " as soon as a ship inclines, her velocity diminishes in proportion as her inclination increases."—

This principle has been verified on different vessels and at different times by several officers, and in various oblique courses. I had no share in those various experiments, and therefore cannot be suspected of partiality: but, as they have always proved, to those who have made them, that the present mode of masting is generally too high, I will not hesitate a moment longer to deliver here an epitome of my own experiments on that subject.*

Having all the sails out, and being hurried on by a strong gale, I ordered all the topgallant-sails, the studding and stay-sails, to be taken in, without the ship losing the least perceptible degree of her velocity; nay, I have seen it sometimes to increase by a twentieth, and that at a time when the ship ran already at the rate of nine or twelve knots an hour.

These trials, which I have made with care, and which were performed so quickly, that the wind had not time to increase or diminish in strength, are sufficient to prove the necessity of lowering the centre of effort of the sails in general, and consequently all the masts. These experiments have been repeated by augmenting the number of sails, sometimes at the risk of overloading the masts; and it has always been found that the velocity did not increase, when the ship is more inclined; but that she laboured more and more in all her parts, as her movements became stronger and the concussion of her pitching rougher, although the sea was not more agitated. At other times, when the ship was tolerably inclined, though the wind was not quite strong enough to hurt the masts, I lessened the number of sails; and it happened that the ship, after that suppression of the topsails, was easier in her movements, steering better, and was, indeed, more easy, though the motion of the sea was still the same; a caution that must not be neglected in these observations, which should be often repeated before a positive decision. However, we do not recommend any diminution in the surface of the sails, in lessening their height; but, it may often happen that we shall rather recommend to increase it upon the whole. For that which is lost in height may be regained by the width. There will even result, from that operation, another advantage; the top-sails, by this method, being shorter, and, thereby, proportionally wider than the lower sails, will be more easily cut to their shape; and, their sides being formed with lines exactly straight, the sail will be the more tight, by which a much greater effect on the ship will be produced. The mast being shorter and the sails wider, with less fall, the surface will be the same: but the effort of that surface will, with the same wind, act on shorter levers, the fulcrum of

* We have thought proper to give, in this chapter, the reasoning of M. BOURDE', although the practice of high masting prevails in the British navy. It has been very justly remarked, that high masts have the advantage of giving an option; because they *enable* a ship, without *obliging* her, to carry a greater quantity of sail than ships with shorter masts.

which will not be altered : therefore, it will operate at a shorter distance from that fulcrum ; the power which makes the ship incline will be much less : and the ship, being more upright, will sail with more velocity, because, her water-lines will be then more advantageous than when she heels. On the other hand, the sails being less inclined, they present a wider surface to the wind, and receive from it a stronger impulsion ; an advantage which must always produce an increase of swiftness and a decrease of drift. Add to this, the real advantages of trimming the sails better, of working them with more ease, or rendering the masting in general more solid, and more capable of resistance in bad weather as well as in battle.

But how must we determine the height for the masts ? or, in other words, how much they are to be shortened ? The Treatises *On the perfect masting and working of ships*, by M. Bougeur, teach us that method. From them I have imbibed the notion of my principles on this subject. But, in order to give a previous idea of that inquiry, and to engage the builders and seamen to bring to perfection this part both of the building and working of ships, upon which, almost as much as from their bottom, their steerage undoubtedly depends, I will subjoin here what M. Brue, a learned and studious officer, imparted to me on the subject.

" The masting," said he, " is absolutely perfect, when the centre of effort of the sails is precisely opposite to, or at the same height as, or parallel with, the *point velique*. What is the *point velique ?* That point in a perpendicular, (raised from the centre of gravity of the horizontal surface of the ship at the floating-line), which is intersected by the direction of the absolute impulse of the sea on the head of the vessel. This is the *point velique* in direct courses."

This is obvious ; nor is any great effort of imagination necessary to conceive this principle, which appears so evident, that it is surprising why it has not yet been made use of. For, this *point* once known, the centre of effort of the sails will be so too ; and their right height, as well as that of the masts, will be determined. A little more calculation, and an attention to the plan of the ship, will be necessary, in order to find out that absolute direction of the effort of the impulsion of the water on the bows. But that should not prevent our inquiry. On the contrary, it should be an additional inducement to those, who, building such good vessels as we are now possessed of, and which might still be of a more advantageous form, will be desirous to make them more perfect, by masting them more properly. This would undoubtedly be the case ; for, several vessels have had their masts cut shorter, and the practice has been attended with decided success. These facts, which could be attested by many able seamen, will always speak highly in favour of this principle ; although, when that shortening was made, the sails were not widened in proportion.

"But," continues M. Brue, "in carrying this inquiry farther than it ever was, the intersection of the two above-mentioned lines (viz. that of the absolute impulse of the water on the bows, and that of the perpendicular of the centre of gravity of the surface of the floating-line of the ship) cannot take place unless in a direct course; and, as soon as the course becomes oblique, they no longer meet. The centre of gravity of a floating-line's surface of the ship passes to the leeward of the axis, on account of the inclination which always occurs in that sort of course: and the direction of the shock of the fluid, which then takes its origin a little to leeward also of the bow, passes, in its prolongation, to windward, without meeting the perpendicular at the centre of gravity of the floating-line's surface;" (which is easily conceived if we represent to our imagination the horizontal edge of that floating-line's surface but ever so little inclined;) "whence it results that, no *point velique* will be found in any course but a direct one. Which is true, unless we could fancy such a ship as would neither drive nor incline in an oblique course. But that is not possible; and hence no perfect mode of masting could be discovered in the last case of the oblique course."

This is true, strictly speaking; for, in each instant of a course, a different point of the bow is struck by the water; which is owing to the pitching of the ship, the continual variations in the strength of the wind, and the greater or smaller inclination produced by the rolling motion of the ship.

"But," says again M. Brue, "the *point velique*, relative to these various circumstances, varies therefore in the proportion of the almost infinite variety of those circumstances, which accompany the course of a ship; that is to say, according to all the degrees of drift, all the degrees of inclination on either board, forward and abaft; as many times, in short, as there are new points of the bow either struck or no longer struck, the *point velique* ascends or descends.

"I pass over the minute examination I could make of each particular cause which contributes to lower that *point* from its utmost height, which is in the direct course, to its lowest, which takes place in the most oblique course, accompanied with the greatest lateral inclination of the ship. And there is no method to get out of that common road which is pursued in determining the dimensions of the masts, but that of attending to the following considerations; viz: Such a ship, being intended for such a latitude, the wind she is most commonly to expect there will be nearly of such a strength, and generally oblique to her course by so many degrees; so that her most common drift will be nearly so many degrees, and her lateral inclination so many, &c. To give her, therefore, the most suitable masting, making her relatively perfect, we must seek for her *point velique* in what situation we shall think most convenient, and there place the centre of effort of her sails."

All this reasoning tends evidently to the shortening of all the masts, and proves the necessity of doing it, at the same time that it determines their height. The most difficult point in that operation is to find out the direction of the absolute impulsion of the water on the bows, when the ship steers a course close-hauled and one with the wind on the beam, with such an inclination as the ship could be supposed to have in either of these two courses; when the wind would allow to have four square-sails set, together with the mizen-topsail. Considering these two suppositions of the wind on the beam, and close-hauled, it will be easy to determine the height of the masts proper for that double situation; because, if the gale blows harder, one may lessen the number of sails; if weaker, one may increase it by adding staysails, topgallant-sails, jib, &c. If the wind gets more aft, then the surface of the sails may be increased again by adding the studding and topgallant-royal sails: finally, it is very clear that topgallant and topgallant-royal sails will always be of service when the centre of effort of the sails should ascend.

CHAPTER VIII.

OBSERVATIONS ON THE DIFFERENT INCLINATIONS GIVEN TO THE MASTING OF SHIPS, WITH RESPECT TO THE WATER-LINE.

THE masts are hardly ever stepped in the same manner in all ships. This too is one of those things which are rather regulated by custom than reason. Some will have them perpendicular, while others choose to have them rake forward and others aft. Each party brings, to support their opinion, reasons drawn from some experiments which chance has sometimes rendered specious.

In this respect we should rely on the judgment of the builder, who ought to know the qualities of his ship, even before he puts her on the stocks. If the opportunity do not present itself of taking directly from him the necessary instructions, it is proper to observe that, if the masts are made to rake forward, the direction of effort of the sails will be inclined towards the bottom, obliquely with the horizon; which will consequently make the head of the ship plunge whenever they receive a strong impulse from the wind: and this may diminish the head-way of the ship, while it increases the celerity of the pitching; the sails also will be with more difficulty trimmed, especially when close-hauled, since the bracing of the yards will be more confined. Therefore, the only

advantage, which can be drawn from this oblique masting of ships, is to render the ships more ready to fall off.

If the masts are perpendicular, the direction of effort of the sails will be horizontal, always supposing the ship to be in an upright position. Therefore, this effort, being uniform, it will preserve a much greater action, and the ship will sail with the greatest velocity she is capable of.

If the masts rake aft, the ship will be more ready to come to the wind, because the sails will be a little more aft ; these will also be more easy to trim sharp, because the braces will not be so much confined. As this position of the sails will raise obliquely above the horizon the direction of the effort on the ship, it follows, that, by their power, the ship will be eased away from the water ; for, it is certain that she will not prolong her course, unless she heels too much ; therefore, she will rise more lightly over the waves, pitch less, keep better the wind, and tack quicker. This is nearly all that can be said in respect to practice.

CHAPTER IX.

OF THE TENSION OF SAILS, AND THEIR TENDENCY TO FIX THEMSELVES PERPENDICULARLY TO THE DIRECTION OF THE WIND.

I. IT is clear that sails are never perfectly flat. But every one is not persuaded that the more extended is the sail, the greater impulsion it receives from the wind which strikes it perpendicularly, and the more effectually, of course, the sail acts on the vessel. It is astonishing that any seamen should be of opinion that a bag must be left at the foot of the sail to lodge the wind in. A hauled-down topsail has as much cloth displayed in it as when hoisted up and well extended. It forms, then, by its convexity, a considerable kind of bag, in which the wind may play at ease ; and it is observed, that the rapidity of the sailing decreases very much ; whence we must necessarily conclude, that the impulse of the wind must have greatly diminished, since the sail produces no longer the same effect upon the vessel. To know demonstratively the cause of that diminution in the impulse of the wind, we have only to pay attention to the air which acts against the foot and the head of the sail ; for, that part of the wind which strikes at the head makes an effort to re-act towards the foot against that which, having struck at the same instant at the foot, endeavours to re-act towards the head. From this shock results (though the air escapes at each side) a compression in the sail. But, after

having acted inwardly, in the same manner as if it were shut up, it finds itself more and more compressed by that which succeeds to the first; and, though it escapes by the sides, it is evident that it tries to extend, and that it impels, consequently, with an equal power, all the parts of the sail perpendicularly; and this is the cause of the sail taking the form of a circle's arc. Therefore the sail will produce no greater effect than if it had no greater height than the space contained between the two yards; it may not even, strictly speaking, have that whole effect; for, that sort of whirl-wind, which is made in the centre, by the reaction of the wind which strikes the upper and lower parts, cannot fail to diminish the shock of those particles, which, succeeding the former, would have struck the sail with all their primitive power; instead of which, this power is now almost entirely destroyed by this barrier which opposes for a while their passage. To which may be added, that the sail, having the form of the arc of a circle, very little wind can strike it perpendicularly; and that it must, of course, have much less effect than another sail, of the same height and width, which should be very exactly stretched out.

The sails of a ship should be cut in such a form as to present as flat a surface as possible.

II. The centre of effort of the impulse of the wind upon the sails, exposed perpendicularly to the course of the wind, answers exactly to the centre of gravity of the surface, struck in that direct situation. But, as soon as it is presented obliquely to the course of the fluid, and kept so, the centre of effort of the total impulse will pass on the weather-side of its centre of gravity; because the particles of air, which at first met the surface, have been reacted, and, by that reaction, they stop part of the passage to the succeeding ones, which diminishes, of course, both the strength of the shock and the impulse they would have communicated to the sail, if their movement had not been interrupted. But this deviation of reaction in the first particles of air which have struck is repeated afterwards. For, all those which succeed them, while the surface is kept obliquely to the wind, continue to react to leeward; so that, from the first vertical line, (taken from the windward side,) out of all those which form together the surface, there is a continual series of obstacles which change the shock of immediate and succeeding particles, and which alters it so much the more as they ought to strike the parts of the sail most to leeward, and so much the less as they will strike those which are most to windward. Therefore, the leeward side of sails, obliquely exposed to the wind, is always less struck than that which stands to windward. Whence it results, that the centre of effort of the absolute impulse of the wind on the sail is lodged in the weather side of the sail, (for it is supposed to be equally divided in two,) since that is the part which receives more impulsion. Therefore, the centre of effort is also to windward of the centre of gravity of the surface; and the removal of

this centre of effort towards the wind is in proportion to the impulse received on the weather side of the sail and that received on the lee side. The truth of this assertion is continually demonstrated by daily experience of ships at sea. The sails are carried by the yards and by the masts, which divide them perpendicularly into two equal parts, from top to bottom, through their centre of gravity. When, being placed obliquely to the wind, they are left at liberty, without being confined by their braces or bowlines, they immediately range themselves perpendicularly to the course of the wind, because their weather side receives more impulse than the lee side : and there they remain constantly, unless their position be altered ; because all their parts are struck equally, and an equilibrium is kept among them ; for, the power of the wind, whether it increase or decrease, acts always the same on them all.

This proof, which shows the difference between the centre of gravity and the centre of effort in the sails, requires much attention in the use of that knowledge in practice. For example, in the middle of the yards on their aft-side, there might be fixed a cleat or bolster, which, in oblique courses, pushing them to leeward, would ease them off from the shrouds, and facilitate their bracing in carrying their centre of gravity, as well as the centre of the absolute effort, a little to leeward ; which operation would of course draw that centre of gravity nearer to the axis of the ship, from which it is so essential to remove it as little as possible.

CHAPTER X.

GENERAL OBSERVATIONS ON THE EFFECT OF MORE OR LESS SURFACE OF SAILS EXPOSED, IN VARIOUS WEATHERS, TO THE WIND.

I. WHEN a ship, with a certain quantity of sail, has acquired the utmost velocity with the power which then puts her in motion, it is certain, that, if the surface of the sails is either increased or diminished, the rapidity of the headway will likewise augment or lessen in a very complicated ratio.

II. When the masting is perfect, that is to say, when the ship is masted according to the *point velique*, she will rise from the water parallel to herself in a certain relative proportion to her velocity, and she will rise always more and more in proportion as she acquires new degrees of velocity in her headway. Because, she is moved by forces which stand exactly and continually in

equilibrium with the action of the water on her bows, the inclination of which forward contributes so much the more to that rising out of the water as it is more remote from the perpendicular.—For, then, the vertical impulsion will have more power, since it acts more directly on a very oblique bow than it would on a vertical one. This reasoning may be as exactly applied to the direct impulsion, the absolute effort of which may be decomposed, since it acts less against the velocity of the sailing on an oblique bow than on a vertical one, while the other part of its action joins with the vertical impulse to raise the head of the ship, which shocks the water with very great strength when she is arrived to a very great velocity, and which water opposes her so much the more as it is shocked with violence. So it is easy to conclude that, in any ship whatever, the more rapid the headway is, the more parallel to herself she rises above the water, if the centre of effort of her sails is at the same height as the *point velique*: for, the point of the bows, on which may be considered as united the action of the water which opposes its progress, may be taken also as the point of bearing. So that all the sails acting from abaft to forward on different points of the axis of the ship, (she being considered as a lever in the direction of her length,) they raise the after part of that point, and place it on a level with the elevation of the bows; which never can happen, if the centre of effort of the sails is above or below the *point velique*. If it is placed above, the power of the sails, acting on too long levers, will raise the after part of the point of bearing of the bows above the level of the elevation of the ship's head. If it is placed below, the power of the sails, acting on too short levers, the after part of the ship will remain plunged in the water, without being able to rise on a level with the bows. Therefore, in either of these two cases, when the centre of effort of the sails is either above or below the *point velique*, the ship, however well built, will lose some of the qualities of sailing, either in her readiness to obey the helm, or in her steadiness to carry sail, especially if she is overmasted: for, in this last case, she will gripe, incline easily, and lose much of her headway, since her bows will plunge in the fluid, or rather her stern will rise too much out of it; which will diminish the action of the water on the rudder and increase it on the bows. In the last case, (an inconvenience of which ship-builders seldom, if ever, have been guilty,) the ship will be managed with difficulty, and her headway will be slackened, because she will never present her most advantageous water-lines to the fluid, nor have a sufficient surface of sails, as, although their width is the same, their height is not so. The point of perfection then is this, viz. when the centre of effort of the sails is placed at the height of the *point velique*.

III. The next proposition will appear a paradox to many seamen. But, it is no less self-evident.

There are many cases in which the adding of a few sails, instead of increasing a ship's velocity, retards it. It is, however, an error into which all seamen almost continually fall, when, in a strong gale, they want either to distance or approach a ship.—When their own ship is arrived to a very great velocity, (sometimes of twelve and more knots an hour,) if they have to do with an adversary the rapidity of which is nearly equal to that of their own ship, they fancy that, by adding more sails to those they have already, at the time when their ship is perhaps best disposed and arrived at its utmost degree of swiftness, they shall increase the rapidity of her headway; and, accordingly, they hoist up some additional stay or studding sails, especially if the wind happens to be on the beam or a little more aft. But, by this their expectations are balked: for the ship becomes more inclining, her head plunges, and the resistance of her bows increasing in the direction of the keel more than the effort of the sails in the direction of the course, the rapidity decreases in so much as the water acts more powerfully than the sail does. Besides all this, those forward and lateral inclinations of the ship, produced by the effort of the new added sail, which have caused the centre of effort of the sails to ascend and the *point velique* to descend, (if the new added sail has been set above it,) cause also the ship not to rise from the water parallel to herself; she raises her stern and plunges her head; whence it results that she gripes from two causes: first, because, as her stern lies less in the water, the rudder is of course exposed to a less shock; and the stern, which always acts as a sail, is more easily mastered by the wind which strikes it then on the beam with a great deal more efficacy than it does her head: on the other hand, as the resistance of the water on the lee-bow has increased by the inclining of the head, plunging thereby that part of the ship which is the most full in its shape, and increasing also the surface on which the water acts, which has both diminished the headway and increased at the same time the lateral impulse on the side of the bow; so that lateral impulsion forces the ship to windward more at the head, than she is impelled to fall off by the lateral part of the effort of the new added sail. Whence it follows that the ship becomes still more griping, which is an additional cause of the decrease of her head way; because, the helm being more a-weather, in order to hold the ship better to her course, more of the rudder itself is presented to the run of the water; and, by the great surface it offers more directly to its shock, retards the velocity of the ship. Whence we are to conclude, that as soon as any more sails are added to a ship which carries already a sufficient quantity of them, she will lose her qualities of steering well and making good headway, whether those additional sails are set forward or a-stern.

CHAPTER XI.

OF THE RESISTANCE OF FLUIDS.

TO investigate a theory of fluids, the principles of which may coincide with attested experiment, the abilities of several eminent mathematicians have been ineffectually applied.

Some opinion may be formed of the difficulty that envelopes a question, on which the excursive mind of a NEWTON has been occupied without the proportionate success: and as on experience alone must be founded our hopes of progressive information, we proceed to impart a brief and perspicuous view of its fundamental conclusions.

Inductive reasoning, from phenomena to causes, and again from causes to other *extraordinary* effects,* was the basis of the philosophy introduced by that admirable disquisitor, whom we have already mentioned; but it is necessary for this purpose that the *medium*, or body, by which the effect is made, should be certainly known. The number and extent however of the corpuscles by which water acts have never yet been ascertained, and probably never will be;† so that, the component parts being *indefinite*, we must be content to reason from observation alone.

The difficulty of ascertaining the impulsion of fluids may be accounted for by the property which they have of acting equally in all directions; by which such extraordinary effects are produced as baffle all the efforts of mathematical demonstration. Bodies, by the laws of mechanics, act only in the direction of gravity; and the indefinitely small corpuscles would be probably influenced by the same causes, if their action upon each other consisted merely in impulsion or contact; but as we know, with respect to air, that this is not the case, our belief that other fluids resemble it in this point is formed by analogy. To imagine therefore a theory which shall comprise the united effects of particles that act by impulsion, repulsion, and friction, may be justly regarded as sufficiently complicate to render its present state of imperfection a natural consequence; and the nature of the subject must perhaps limit our discoveries in it to mere *approximation*.

All fluids have pores, or vacuities, in common with all other bodies; for if salt be mixed with water, its weight, to a certain degree, will be increased without any augmentation of bulk: and this remark will apply elsewhere.

Air and water are the fluids on which we now purpose to descant; and more immediately, the latter; which partakes more

* Or Phænomena.——"Celeberrimus auctor, cum ex phænomenis motuum investigasset vires naturæ, deinde ex istis viribus demonstravit phænomena reliqua."—Præfat Optic.

† With a microscope possessing an augmented power of 10,000, no one has yet pretended to discover the corpuscles of water.—LOCKE.

than air of a fluid nature, as it will find its way through smaller pores. Its consistent parts are regarded as solid and spherical. But hardness must not be confounded with solidity ; for, however small the particles of any substance, they always possess this latter quality, and form themselves, with respect to liquids, into small spheres or globules ; which accounts for their facility of motion. Air, as it rises above the earth's surface, becomes rarer ; and its rarity increases in geometrical proportion—i. e.—at 14 miles' height, it is four times more rare than at 7 miles, or $\frac{1}{2}^4$, because $2 \times 2 = 4$; and so proceed. A square inch of quicksilver, $29\frac{1}{2}$ inches, weighs 15lbs ; which pressure is exerted by the air on every square inch of the earth's surface.

However, in serene weather, the air can balance a column of quicksilver, 31 inches high ; in stormy weather, 28 : and it is about 860 times heavier than water, as a column of water 33 feet high is equal to $29\frac{1}{2}$ inches of quicksilver.

Immensely elastic qualities of expansion and condensation discriminate more peculiarly the air from other fluids ; it has been dilated by Mr. Boyle into 13,679 times its customary space ; but its compression has not been yet carried so far ; although the limits of both these powers have not been ascertained, it has been contracted into about 1500 times lesser extent.

The air, like every other fluid, preserves its equilibrium every way, obliquely, perpendicularly, and in a parallel direction ; so that, by this mutual equipoise, the softest bodies sustain no injury, and the brittlest no fracture. But if a vacuum be artificially created on any particular part of a substance, the opposite side will immediately experience the effects of that pressure upon it which is no longer counterbalanced.

Among the physical discoveries of the present age, we may reckon the generative principle of water ; which is compounded of two elements, Oxygen and Hydrogen, or, pure and inflammable air ; which, when united, are susceptible, by the medium of fire, into *decomposition*, or condensation into water.

By no other body than fire is water surpassed in penetrative power ; an instance of which will be found below.*

* A globe of gold, in an experiment by the academicians of Florence, although a very close metal, admitted through its pores the water enclosed in its cavity : the liquid, resisting an immense external force, appeared like dew-drops on the circumference. In the Philosophical Transactions abridged, vol. 12, part 1, art. 47, we find a paper on the compressibility of fluids, by John Carton, Esq. : the substance of which is as follows :

Water is more compressible when hot than when cold ; and the sea is compressed, at two miles deep, 69 feet 2 inches, by its own weight; and, at the bottom, in a ratio of 13 parts out of 1000. The compression on different fluids, by the weight of the atmosphere, is,

	Millionth parts.	Specific gravity.
Spirit of wine	66	846
Oil of Olives	48	918
Rain-water	46	1000
Sea-water	40	1028
Mercury	3	13595

The results of its *incompressibility*, or solidity, in which it differs not from all substances, is that the smallest depth of water, below the water-line, will lift and float the largest ship, or any body that occupies more space than itself, as effectually as the whole ocean.

We must allow the faculties of attraction and repulsion to be both inherent in the particles of water; each of itself a solid consistent body, becoming fluid by its junction with other particles. That they attract each other may be deduced from the drops of all perfect liquids affecting the spheric form; and from the expansion of water when heated, and the possibility of re-converting it into two permanently elastic fluids * repulsion appears equally evident. But, to reconcile without inconsistency our sentiments of both these inherent powers, we may rationally imagine that they are not both exerted at the same time, but that one ends as the other commences.

A few primary lemmas of hydrology are as follow.

I. All fluids will find their own level: i. e.—if one part of a fluid be higher than another, the higher part will descend by its specific gravity until the surface be quite level.

II. Equal parts of a base parallel to the horizon will sustain an equal pressure from an incumbent fluid; and hence, all parts of a fluid, at the same depth, press equally.

III. The pressure of fluids upwards and sideways is equal to their pressure downwards; which is always in proportion alone to their perpendicular height.

IV. A body of equal or inferior specific gravity will displace, when immersed, so much of the fluid as is equal to itself in weight; and will sink to the depth requisite for this purpose. If the body be heavier, it will descend to the bottom of the fluid.

V. A body immersed in a fluid, loses as much weight as is contained in an equal quantity of the fluid; and the fluid gains it. Hence,

1. All bodies of equal magnitude lose equal weight in the same fluid. 2. The various weights lost by the immersion of the same bodies in different fluids are as the respective specific gravity of the fluids; and bodies of equal weight lose it in the same fluid, proportionally to their own specific gravity. 3. The weight of a body swimming in a fluid is equal to so much of the fluid as is occupied by the immerged part.

VI. The proportional velocity with which water spouts from an orifice in the side or bottom of a vessel, is as the square roots of the depth of the orifices below the surface of the water; or, to the velocities that would be acquired by a body falling perpendicularly through those different heights. In order, therefore, to cause twice the quantity of fluid that runs through one orifice to be emitted from another of equal surface, *four* times the height

* Pure and inflammable air.

or pressure is necessary: consequently, the water admitted by a leak in a ship one foot below water will be but one half of the quantity that finds its way at the depth of four feet; because the square root of 4=2; or, because the respective velocities acquired by a falling body at one and four feet, are 8 and 16; which bear the proportion of one to two.

Galileo was the first who demonstrated the reason of this circumstance:—while a body is falling towards the earth, the force of gravity is continually acting upon it from second to second: and as it has nothing to oppose its progress. if the attraction were to cease at one second of time, it would still descend with the same velocity as it had already acquired: a natural consequence is that, at the end of each additional second, it moves with a velocity occasioned by the force of attraction sustained during that portion of time superadded to what it before had. Thus, having acquired at the end of one moment a velocity of thirty-two feet, by the attraction of gravity, at the end of two, it will not only possess this degree of quickness, but also that which another moment of attraction has given it: i. e.—32+32=64.

In the experiments made with bodies floating on the surface of the water, there is found to be an addition to the resistance arising from the inertia of the water, which accumulates in a small degree on its anterior or head surface, and is depressed behind it. Hence arises a hydrostatic pressure on the head-surface, acting in concert with the true resistance. By way of illustration we may add that, it has frequently been observed, from the poop of a second-rate man of war, when sailing at the rate of 11 miles an hour (about 16 feet per second) not only that the back of the rudder was raked for about two feet below the load-water line, but that the trough or wake made by the ship was filled up with water, which was broken and foaming to a considerable depth and distance from the vessel. Where this dead-water is observed, there must of course be a partial diminution of pressure, which will operate as an additional resistance. Both these additional impulsions form the two first articles of the following

DEFINITIONS,

which are generally employed in professed treatises, to the first of which we attribute the term of

1. PLUS PRESSURE, by which is meant the *additional* pressure that is sustained by the foremost part of a body moved through a fluid, *besides the head pressure*. It therefore arises from the *impetus* of the body in displacing the fluid, which forces the latter upward. We may then consider it as compounded of the *impetus*, and this sort of friction.

2. MINUS PRESSURE is a subtraction of pressure on the stern, occasioned by the equilibrium being not there preserved; or, by the fluid not pressing so strongly on that end when the body is in motion as when it is at rest.

3. FRICTION is formed by the united causes of the fluid particles' adhesion, and the roughness of the moving body: and must be added to the other resistances occasioned by the laws of specific gravity, in order to acquire the

4. TOTAL RESISTANCE; which consists, besides the preceding, of

5. HEAD-PRESSURE; the total pressure against the fore-part of a body, immersed wholly or in part, when such body is at rest: and,

6. STERN-PRESSURE, the total pressure against the stern-end of a body, immersed wholly or in part, when such body is at rest.

7. By HEAD-RESISTANCE is meant, the Plus Pressure and the friction of the water against the head end, united.

8. STERN-RESISTANCE, the minus pressure and the friction of the water against the stern-end, united.

Few subjects have excited so much controversy as the laws by which the resistance of fluids are increased; we subjoin the leading propositions which formerly received the general sanction of scientific men on the subject.

From the theories which have been offered to the public since the time of Sir Isaac Newton, were deduced the following principles as the laws of the resistance, &c., of fluids. We give them here in order to show how far they have been found to agree with actual experiment, in what respects they differ, and to prevent the young artist from retaining those erroneous ideas of the subject which he may, perhaps, have already acquired.

1. "The resistances, and (by the laws of motion) the impulsions, of fluids on similar bodies are proportional to the surfaces of the solid bodies, to the densities of the fluids, and to the squares of the velocities, jointly."

2. "The direct impulse of a fluid on a plane surface, is to its oblique impulse, on the same surface, as the square of the radius is to the square of the sine of the angle of incidence."

3. "The direct impulse on any surface is to the oblique impulse, on the same surface, as the cube of radius to the solid which has for its base the square of the angle of incidence, and the sine of obliquity for its height."

4. "The direct impulse of a stream of fluid, whose breadth is given, is to its oblique effective impulse in the direction of the stream as the square of radius to the square of the sine of the angle of incidence."

The numerous experiments with which these propositions have been compared, have most decidedly proved that they are, with the exception of the first, exceeding erroneous : and even that is not in all cases correctly true, as will be seen hereafter ; but the deviation is, in general, of little consequence practically.

PROPOSITIONS RELATIVE TO RESISTANCE.

I. " The resistance which any body meets with in moving through a fluid is nearly as the square of the velocity ; for the resistance of a fluid may be considered as compounded of the number of particles struck, and the velocity with which one particle is struck. Now, the number of particles struck in any time being as the velocity, it follows that the whole resistance will be as the square of the velocity nearly.

" Hence, if a stream of water, whose diameter is given, strike against an obstacle at rest, the force against it will be nearly as the square of the velocity of the stream.

II. " The centre of resistance of any plane, moving directly forward in a fluid, is the same as the centre of gravity. Or, it is that point to which, if a contrary force be applied, it shall just sustain the resistance. Now, the resistance is equal upon all equal parts of the plane, and, therefore, the resistance acts upon the plane after the same manner, and with the same forces, as gravity does ; consequently, the centre of both the resistance and gravity must be the same.

" Therefore, in any body moving through a fluid, the line of direction of its motion will pass through the centre of resistance, and centre of gravity, of the body. For, if it do not, the forces arising from the weight and resistance will not balance each other ; which will cause the body to vibrate or oscillate in the fluid, till by degrees the situation of these two centres will fall into the line of their motion."*

However, it has been maintained by others† that, the resistance experienced by a body in moving through a fluid is not as the square of the velocity, and the square of the sine of the angle of incidence, but as the *simple* velocity and the sine simply of the angle of incidence : but in fact, it appears that, the theoretic law first stated agrees tolerably with observation in large angles of incidence, or those not differing much from the perpendicular ; but in more acute angles, the resistances are more nearly proportioned to the sines of incidence than to their squares.

* In the generally received theory of hydraulics, several other propositions may be found relative to the subject of resistance, and which we have omitted, as of little utility.

† Among these, Don George Juan, in the *Discours Preliminaire* of his *Examen Maritime*, 4to. which see.

The force requisite to sustain a body against the velocity of a current, is nearly equal to the resistance that the body would experience, if it were moved, with a velocity equal to that of the current, through stagnant water ; and as the former is more easily ascertained than the latter, experiments are generally regulated accordingly.*

CHAPTER XII.

EXPERIMENTS WHICH HAVE BEEN MADE FOR DETERMINING THE RESISTANCE, ETC., OF FLOATING BODIES.

We shall now relate the experiments which were made at the expense of the French Royal Academy of Arts and Sciences, as also a few which were published in the year 1806, by Colonel Beaufoy.

A square iron plate, containing 144 superficial inches, was immersed in water to the mean depth of six feet: and in the annexed table, the first column contains the velocity of the plane in feet per second ; the second, columns of water, the base of each being one square foot, and their respective altitudes equal to the space a body must fall to acquire the velocities of 1, 2, 3, 4, 5, 6, &c., feet per second ; the third, the weight of the different columns in pounds avoirdupois ; the fourth, the resistance of the plane by experiment; the fifth, the differences between the theoretical and experimental resistances ; and the sixth, the minus pressure found by experiment.

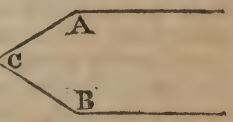
TABLE.

Feet.	Feet.	lbs.	lbs.	lbs.	lbs.
1	0.0156	0.975	1.295	0.320	0.1629
2	0.0621	3.886	5.986	2.100	0.6278
3	0.1399	8.745	10.931	2.188	1.3668
4	0.2487	15.543	19.048	3.505	2.361
5	0.3886	24.287	29.279	4.992	3.591
6	0.5596	34.975	41.585	6.610	5.045
7	0.7616	47.603	55.927	8.324	6.707
8	0.9948	62.175	72.27	10.095	8.563
9	1.2590	78.69	90.59	11.90	10.607
10	1.5544	97.15	110.86	13.71	12.82
11	1.8808	117.82	133.05	15.23	15.241
12	2.2383	139.90	157.20	17.30	17.675
1	2	3	4	5	6

* "The difference in the resistance of the same body, moving in a stream or current, or moving in still water, may be readily conceived when we consider

Whence it appears, that the difference between theory and experiment should in this case be attributed to the minus pressure.

The committee, by whom the experiments of the French Academy were made, consisted of the Marquis de Condorcet, M. d'Alembert, M. l'Abbé Bossut, and others; who, for this purpose, made use of fifteen boxes or vessels which were two feet wide, two feet deep, and four feet long. One of them was a parallelopiped of these dimensions; the others had prows, or head ends, of a wedge form, thus:



The angle A C B varying by 12 degrees, from 12 degrees to 180, or a direct plane; so that the angle of incidence increased by six degrees from one to another. These boxes were dragged across a very large basin of still water, (in which they were immersed two feet,) by means of a line, passing over a wheel, connected with a cylinder, from which the actuating weight was suspended. The motion became perfectly uniform after a very little way; and the time of passing over 96 French feet, with this uniform motion, was carefully noted.

The resistance was measured by the weight employed, after deducting a certain quantity for friction, and for the accumulation of the water against the anterior or head surface. The result of the many experiments is given in the following table.

Angle of the Head End.	Resistance according to Theory.	Resistance according to Experiment.	Difference between Theory and Experiment.
180°	10000	10000	0
168	9890	9893	+3
156	9568	9578	+10
144	9045	9084	+39
132	8346	8446	+100
120	7500	7710	+210
108	6545	6925	+380
96	5523	6148	+625
84	4478	5433	+955
72	3455	4800	+1345
60	2500	4404	+1904
48	1654	4240	+2586
36	955	4142	+3187
24	432	4063	+3631
12	109	3999	+3890

that, in the former case, the body sails on a *sloping* surface, not merely *along with the stream*, but *down it*, and will therefore go faster than the stream, because it is floating on an *inclined plane;* and if we examine it by the laws of hydrostatics, we shall find that, besides its own tendency to *slide* down this inclined plane, there is an odds of hydrostatical pressure, which pushes it downwards.' *Encycl. Brit.*

The resistance to one square foot, French measure, moving with a velocity of 2.56 feet per second, was very nearly 7.625 pounds French. Reducing these to English measures, we have the surface equal to 1.1363 feet, the velocity of the motion equal to 2.7263 feet per second, and the resistance equal to 8.234 pounds avoirdupoise.

There is a great diversity in the values which different authors have deduced for the absolute resistance of water from their experiments. In the value now given, nothing is taken into account but the inertia of the water. The accumulation against the fore part of the box was carefully noted, and the statical pressure backwards, arising from this cause, was substracted from the whole resistance to the drag. A sufficient variety of experiments was not made for discovering the share which tenacity and friction produced; so that the number of pounds here set down may be considered as somewhat superior to the mere effects of the inertia of the water.

From these experiments we may perceive that the effects of the obliquity of incidence deviate enormously from the theory of the mathematicians; and that this deviation increases rapidly as the acuteness of the prow, or head end, increases. In the prow of 60 degrees the deviation is nearly equal to the whole resistance pointed out by the theory; and, in the prow of 12 degrees, it is nearly 40 times greater than the theoretical resistance.

These experiments are very conformable to those of other authors on plane surfaces. Mr. Robins found the resistance of the air to a pyramid of 45 degrees with its apex foremost, was to that of its base as 1000 to 1411 instead of one to two. Chevalier Borda found the resistance of a cube, moving in water in the direction of the side, was to the oblique resistance, when it was moved in the direction of the diagonal, in the proportion of 5½ to 7; whereas, by the theory, it should have been that of the square root of 2 to 1, or of 10 to 7 nearly. He also found, that a wedge, whose angle was 90 degrees, moving in air, gave for the proportion of the resistances of the edge and base 7281 to 10000, instead of 5000 to 10000. Also, when the angle of the wedge was 60 degrees, the resistances of the edge and base were 52 and 100, instead of 25 and 100.

As the very nature of naval architecture seems to require curvilineal forms, in order to give the necessary strength, it seemed of importance to examine more particularly the deviations of the resistances of such prows from the resistances assigned by theory. The academicians therefore made vessels with head-ends of a cylindrical shape; one of these was a half cylinder, and the other was one third of a cylinder, both having the same breadth, viz. two feet, the same depth, also two feet, and the same length, four feet. The resistance of the half-cylinder was to the resistance of the perpendicular prow in the proportion of 13 to 25, instead of being as 13 to 19.5. The Chevalier Borda found nearly

the same ratio of the resistances of the half-cylinder, and its diametrical plane, when moved in air. He also compared the resistances of two prisms or wedges of the same height and breadth. The first had its sides plane, inclined to the base in angles of 60 degrees: the second had its sides portions of cylinders, of which the planes were the chords, that is, their sections were arches of circles of 60 degrees. Their resistances were as 133 to 100, instead of being as 133 to 220, as required by the theory; and, as the resistance of the first was greater in proportion to that of the base than the theory allows, the resistance of the last was less.

Mr. Robins found the resistance of a sphere moving in air to be to the resistance of its great circle as 1 to 2.27; whereas the mathematical theory requires them to be as 1 to 2. Borda found the resistance of the sphere moving in water to be that of its great circle as 1000 to 2508. He also found the resistance of air to the sphere was to its resistance to its great circle as 1 to 2.45.

It appears, on the whole, that the theory gives the resistance of oblique plane surfaces too small, and that of curved surfaces too great; and that it is quite unfit for ascertaining the modifications of resistance arising from the figure of the body. The most prominent part of the prow changes the action of the fluid on the succeeding parts, rendering it totally different from what it would be, were that part detached from the rest, and exposed to the stream with the same obliquity.

These experiments of the French Academy are of importance, because they give us the impulses on plain surfaces with every obliquity. By referring to them, we may perceive the proper obliquity in many cases, and can tell what is the proper angle of the sail for producing the greatest impulse in the direction of the ship's course, &c.

It appears, from a comparison of these experiments, that the impulses and resistances are very nearly in the proportion of the surfaces. They appear, however, to increase somewhat faster than the surfaces. The Chev. Borda found that the resistance, with the same velocity, to a

Surface of		Resistance			
9 Inches	was	9			9
16 . .	—	17.535	instead	of	16
36 . .	—	42.750			36
81 . .	—	104.737			81

The deviations in these Experiments from the theory appeared to increase with the surface, and is probably much greater in the extensive surfaces of sails, &c.

It has been observed by a learned and ingenious writer, that, "the experiments of the French Academy, above described, are of great value, and may always be appealed to; but that there are circumstances in them which render them more complicated than

is proper for a general theory, and which therefore limit the conclusions that might otherwise be drawn from them. The bodies were floating on the surface; and this circumstance necessarily produced the *plus* and *minus pressures*, or what the academicians called the *Remou*, or accumulation on the fore part of the body and depression behind it. This resistance was measured with great difficulty and uncertainty, as was likewise the effect of adhesion or friction of the water, which must also have been very considerable and very different in the different cases. It is necessary to consider these particulars as making part of the resistance in the most important practical cases, viz. the motion of ships; for here we see that its effect is very great; as it is well known that the speed, even of a coppered ship, is *greatly* increased by greasing her bottom, and thereby reducing the effect of this adhesion, &c.: and it is, therefore, to be concluded, that the form of these experiments was not so well suited as could be wished for the complete determination of the causes of resistance."

Le Chevalier de Baut has found that the resistances of different surfaces, *equally immersed*, is greater than in the proportion of the breadth: that is, a broader plane not completely immersed will be resisted more than a narrower one, equally immersed, by a difference greater than that of the breadth. This has been also observed by Le Chev. Borda.

EXPERIMENTS ILLUSTRATIVE OF THE MOTIONS OF RESISTED FLUIDS BY THE CHEVALIER DE BAUT.

We will suppose two planes, A and B, of which the lesser (A) shall be one foot square, and the larger (B) two feet broad by one foot deep. Let these be equally immersed: then will the resistance of B be greater in proportion to its surface than the resistance of A in proportion to its surface. For, it is evident, that there will be an accumulation against both; but the elevation against B will be proportionally greater than that against A, because the lateral escape of the water from the greater surface is more difficult than that from the lesser, as will appear from the following experiments.

The instrument made use of in these experiments was that represented in the margin. It consisted of a square brass plate, A B G F, pierced with a great number of holes, and fixed in front of a shallow box, represented edgewise in *fig.* 2. The back of this box was pierced with a hole C, in which was inserted the tube of glass C D E, bent square at D. This instrument was exposed to a stream of water, which beat on the brass plate. The water having filled the box through the holes, stood at an equal height in the glass

tube, when the surrounding fluid was stagnant ; but, when it was in motion, it always stood in the tube above the level of the smooth water without, and thus indicated the pressure occasioned by the action of the stream.

When the instrument was not wholly immersed, there was always a considerable accumulation against the front of the box, and a depression behind it. The water before it was not stagnant; indeed it could not be ; for, as M. Baut observes, it consists of the water which was escaping on all sides ; and, therefore, upwards from the middle of the stream, which meets the plate perpendicularly in C, considerably under the surface. It escapes upwards, and, if the body were sufficiently immersed, it would escape in this direction almost as easily as laterally. But, in the present circumstances, it heaps up, till the elevation occasions it to fall off sideways as fast as it is renewed. When the instrument was immersed more than its semi-diameter under the surface, the water still rose above the level, and there was a great depression immediately behind this elevation. In consequence of this difficulty of escaping upwards, the water flows off laterally ; and, if the horizontal dimensions of the surface be great, this lateral efflux becomes more difficult, and requires a greater accumulation. From this it happens, that the resistance of broad surfaces, equally immersed, is greater than in the proportion of the breadth.

It was therefore found that the pressure on the centre was much greater than towards the border ; and, in general, the height of the water in the tube D E was more than four thirds, or one and one third, of the height necessary for producing the velocity when only the central hole was open. When various holes were opened at different distances from the centre, the height of the water in D E continually diminished as the hole was nearer the border. At a certain distance from the border the water at E was level with the surrounding water, so that no pressure was exerted on that hole. But the most unexpected and remarkable circumstance was, that in great velocities, the holes at the very border, and even to a small distance from it, not only *sustained no pressure, but even gave out water ;* for the water in the tube was *lower* than the surrounding water. M. Buat calls this a non-pressure. In a case in which the velocity of the stream was three feet, and the pressure on the central hole caused the water in the vertical tube to stand thirty-three lines, or thirty-three twefths of an inch, above the level of the surrounding smooth water, the action on a hole at the lower corner of the square caused it to stand twelve lines lower than the surrounding water. The intermediate holes gave every variation of pressure, and the diminution was more rapid as the holes were nearer the edge ; but the law of diminution could not be observed.

This was a new and unexpected circumstance in the action of fluids ; yet it will be found consistent with the genuine principles of hydraulics : for a consideration of the subject will show, that if

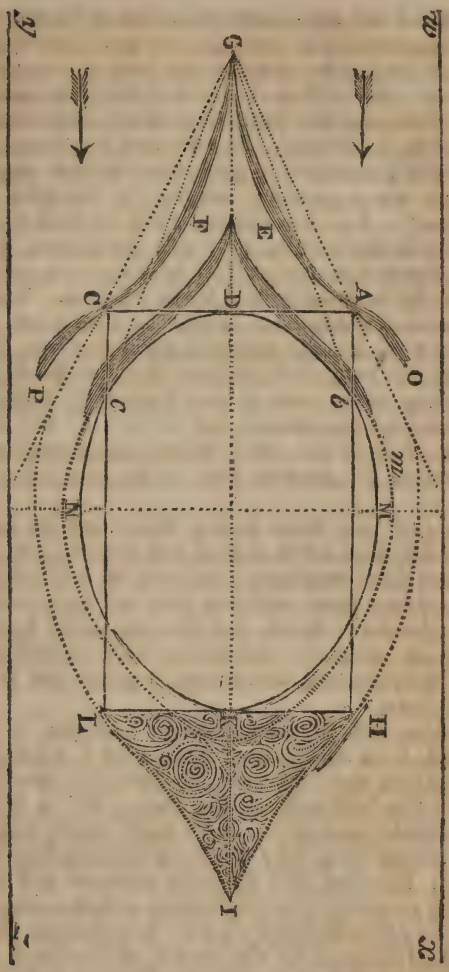
the middle alone were struck with a considerable velocity, the water might even rebound, as is frequently observed. This actual rebounding is here prevented by the surrounding water, which is moving with the same velocity: but the pressure may be almost annihilated by the tendency to rebound of the inner filaments.

Part (and perhaps a considerable part) of this apparent non-pressure is certainly produced by the tenacity of the water, which takes off with it the water lying in the hole. At any rate, this is an important fact, and gives great value to M. Baut's experiments.

From the experiments it appeared also, that with respect to the resistance, it is of no less consequence to attend to the form of the hinder part of the ship than to the shape forward. This truth seems to have been established by the experience of all nations. Nevertheless M. Buat particularly directed his experiments to the ascertainment of this object, and with success; for they plainly show the great importance of due consideration as to the action of the fluid on the after part of the body.

It is clear, from what has been before advanced, that the whole impulse or resistance, which must be withstood or overcome by the external force, is the sum of the active pressure on the forepart, of the non-pressure on the hinder part, and the effect of adhesion; or, in other words, the sum of the plus and minus pressures and of friction. The experiments of M. Buat showed that this does not depend solely on the form of the head, but also on the length of the body. It appeared by some of the experiments, that the non-pressure on the hinder part was prodigiously diminished (reduced to one-fourth) by making the length of the body triple of the breadth. And hence it appears, that merely lengthening a ship, without making any change in the form either of her head end or stern end, will greatly diminish the resistance to her motion through the water; and this increase of length may be made by continuing the form of the midship frame in several timbers along the keel, by which the capacity of the ship, and her power of carrying sail, will be greatly increased, and her other qualities improved, while her speed is augmented.

With respect to the operation of a fluid on floating or resisting bodies, we may conceive it advancing against the flat surface of a solid, as the side or end of a cube or parallelopiped; and the question is, in what manner does the fluid operate, and what particles or filaments immediately strike the body, and how are they deflected? Our ideas on this subject must be collected from the nature of repulsion, which we have yet in a considerable degree to learn, although our knowledge of impulsion is much superior. The process appears to be nearly as represented in the annexed figure, supposed to represent a solid floating in a stream of fluid, by which it may be observed, that there remains at the anterior part or head end of the body a quantity of fluid, as A G C, operating as if almost stagnant, and having two curved concave sides A E G, C F G, along which the middle filaments glide. This fluid.



which is very slowly changed, would, if there were no cohesion or friction, have a determined ratio to the size of the body, if of similar shape; as there can be no doubt but that the figure AEGFC would in every case be similar. But, with the disturbing force of tenacity in the fluid, a change of form in this otherwise still body must happen. The friction also, which produces an effect proportional to the velocity, must likewise alter the ratio; and we may conclude that the effect of both these circumstances will be to diminish the quantity of this fluid, otherwise stagnant, by taking or involving it away externally; and to this

must be ascribed the well-known fact, that it is never perfectly stagnant, but generally has a whirling motion. We may also conclude that this fluid at the head of the body will be more incurvated between G and C, than it would have been, independent of tenacity and friction; and that the arch H I, astern, will, on the contrary, be less incurvated. And we may conclude, that there will be something opposite to pressure, or what may be called *abstraction* or *minus pressure*, exerted on the stern or hinder part of the body. For the stagnant fluid, or dead water astern, H K I, adheres to the surface H K; and the passing fluid, which flows in the direction of the parallel lines $w\,x$, $y\,z$, tends to draw it away both by its tenacity and by its friction. This must of course, augment the apparent impulse of the stream on such a body, and it must greatly augment the resistance, that is, the motion lost by this body in its progress through the fluid: for the body must drag along with it this stagnating water, and drag it in opposition to the tenacity and friction of the surrounding fluid. The effect of the dead water, ahead and astern, constitutes therefore the greatest part of the resistance of floating bodies.

Hence we find that those bodies which are so formed as to have least of this dead water at head and stern may be considered as the solids of least resistance; and that on such a figure or parallelopiped, whose head and stern ends are square and perpendicular, as in the above figure, the plus and minus pressures (together) will be greatest, increasing proportionably with the breadth of the figure, and decreasing in proportion to the length or change of figure.

If we contemplate the operation of a stream of fluid upon another figure, as on an ellipsis or oval, B M K N, we shall perceive that the resistance must be less, because the quantity of dead water will be less both at head and stern; for, in this case, the deflected filaments form angles much more obtuse with the direction of the stream than they would, if deflected by the square surface A B C; likewise, that the stern pressure will be less disturbed and be more equal in comparison with the other pressures than that of the parallelopiped A H C L. It is obvious, for instance, that the filament deflected by the point A, of the latter, will be deflected in the direction A O, while the filament deflected by the outer point *b*, of the ellipsis, will be deflected in the direction *b m*, which more easily unites with the stream, and with the pressure on the after part of the body.

If there be some distance between the head and stern, the divergency of the filaments, which had been turned aside by the head, is diminished by the time that they come abreast of the stern, and should turn in behind it. They are therefore more readily made to converge behind the body, and a more considerable part of the surrounding pressure remains unexpended, and therefore presses the water against the stern; and, it is evident,

that this advantage must be so much the greater as the body is longer, not however exceeding a certain length.

This treatise might be hence extended to a considerable length; but it is presumed that the foregoing examples will display, to the intelligent observer, a competent and methodized abstract of the more important discoveries, with which the subject has been hitherto illustrated, through the transpicuous medium of experimental philosophy.

PART III.

THE

PRACTICE OF WORKING SHIPS.

THE useful part of a seaman's duty is the application of his theoretic knowledge to the various evolutions of a ship. We are about to show how those various evolutions should be performed, consistently with the principles upon which the science of navigation is founded.

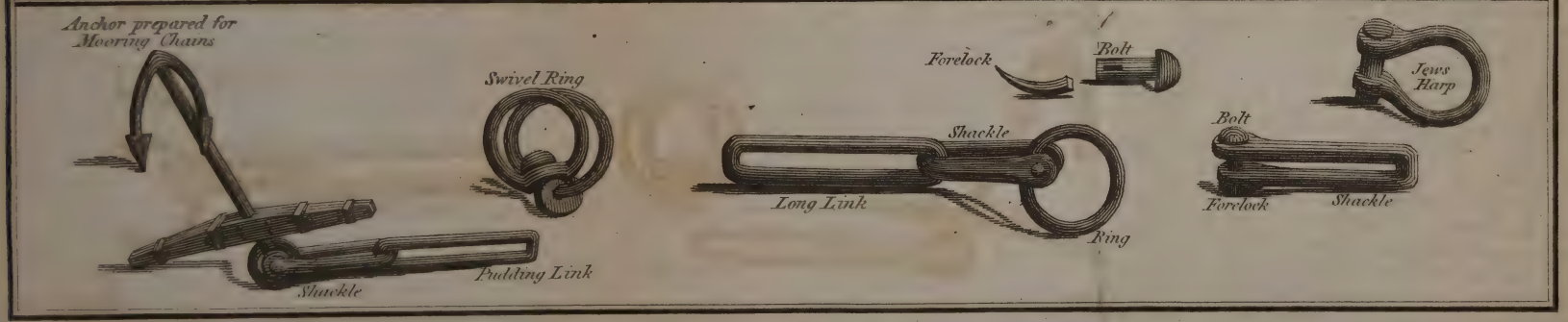
A ship, when launched from the stocks, is furnished with one stream-anchor, and another which is termed a launching-anchor, somewhat heavier than the stream-anchor, hanging by stoppers to the catheads: by one or both of these she is first brought up, and afterwards warped to what are termed

Head and Stern Moorings;

of which the following is an accurate description. Across the bottom of the harbour or river, two chains (parallel to each other, if the bed of the river will admit of it) are extended at the distance of 200 feet from each other, by means of anchors, having one fluke only, which is sunk and secured in the ground by piles on the opposite sides near low-water mark. To the rings of those anchors these chains are connected by a peculiar sort of link, called a shackle, which is delineated in the plate.

Each of these chains has, at about one-third of its length, a large iron ring, to which is fastened a chain, called an up-and-down span; which, lying on the ground, connects the parallel chains, and serves to keep them steadily in their places. At about 30 or 40 feet distance from each other, along each chain, chain-pendents (from 5 to 9 in number) are fastened, having, at the end which connects with the ground-work, a shackle; and, at the other end, a link called a jew's harp, through which the bridle or hawser of the ship, when moored, is passed. The centre chain-pendent is fixed to the ring of the chain; and the number of the chains must depend upon the number of tiers required, each tier

A REPRESENTATION OF MOORING CHAINS.



NEW-YORK, PUBLISHED BY EDM. M. BLUNT & SOLD BY W. HOOKER AND E. & G. W. BLUNT, 1824.

occupying two chains, because the ships are moored head and stern. But every tier does not always occupy two whole chains; because, unless a passage between the tiers is requisite, the chain, to which the head chain-pendent of one tier is affixed, has likewise fastened to it the stern chain-pendent of the next tier. A reference to the plate will elucidate.

These moorings are calculated for and used in rivers or harbours of small extent; but, in other places, where either many ships do not frequent, or the extent of which is considerable, there is another sort in use, called

Swinging Moorings.

These differ from the former only in this; the ground-work being the same, to the ring of the chain is fixed one chain-pendent, the end of which is passed through a large buoy; and to that is connected a swivel-ring by a shackle; and thus kept constantly from sinking to the ground. This is used for mooring-to one or two ships. Near each end of the chain is fixed one more chain-pendent, supported likewise by a buoy, which is used only for the purpose of warping ships from the middle to any intended place.

Of Mooring to Head and Stern Moorings.

To these moorings, ships are thus fastened: clench the end of a bridle to the jew's harp of the chain pendent, and pass it into the hawse-hole; then heave it up and bit it. Take the after-bridles into the gun-room port, or in upon the quarters; and take a round turn about the beam of the after-hatch, and cross it with a throat and round seizing; or, if more convenient, round the jeer bits.

Of Mooring to Swinging Moorings.

Pass out the ends of the bridle; one on each side, through the hawse-hole next the stem; then pass them through the swivel-ring of the chain-pendent; then return them into the ship through the after hawse-holes, and bit them.

In this situation a ship is fitted for sea, by regularly stowing her ballast, and getting on board her rigging, stores, &c.

We shall therefore proceed to discuss the theory and practice of ballasting, and shall afterwards treat of the manner of getting on board and stowing the anchors and cables, before we enter upon the method of navigating a vessel in various situations.

Of the Ballast and Lading.

When a ship is loading, it should be considered, that her tendency to pitch or roll depends not alone on her form, but even

more upon the advantageous distribution of the heaviest parts of her cargo.

Particular attention is to be paid to moderate her pitching, as that is what most fatigues a ship and her masts; and it is mostly in one of these motions that masts are seen to break, particularly when the head rises after having pitched. Although the rolling be proportionably a more considerable movement than pitching, it is seldom that any accident is seen to arise from it, as it is always a slow one. It is, however, not less proper to prevent it as much as possible. This will, in general, be easily obtained, without being any way detrimental to the ship's stiff carrying of sail, if, when the ballast is iron, it is stowed up to the floor-heads; because it will recall the ship with less violence after her having inclined, and it will act on a point but little distant from the centre of gravity. To make this clearer, let us consider it by the assistance of a figure.

First, let it be understood, that the *centre of gravity* of a body is that point by which it may be suspended, and the parts remain in perfect equilibrium.

That the *centre of cavity* is the centre of that part of the ship's body which is immersed in the water; and which is also the centre of the vertical force that the water exerts to support the vessel.

That the *centre of motion* is the point upon which a vessel oscillates or rolls when put in motion.

That the *metacentre* is that point, above which the centre of gravity must by no means be placed; because, if it were, the vessel would overset.

Various methods have been recommended to find all these different points; some of them are in their nature fixed; others, varying. Thus, when a ship is completely loaded, the centre of gravity is fixed, howsoever the vessel may alter her position.

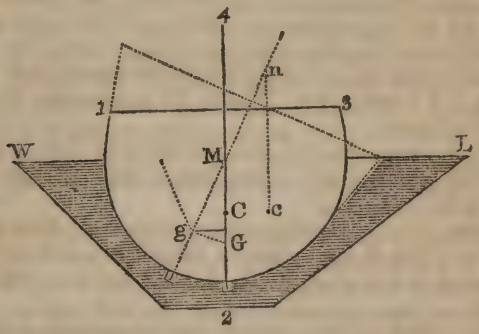
The centre of motion is always in a line with the water's edge, when the centre of gravity is even with or below the surface of the water; but, whenever the centre of gravity is above the water's surface, the centre of gravity is then the centre of motion. This must be understood of bodies not perfectly circular; for, if circular, the centre of motion will be the centre of the circle.

The centre of cavity varies with every inclination of the ship, because that depends upon the shape of the body immersed.

The metacentre (which has been likewise called the *shifting centre*) depends upon the situation of the centre of cavity; for it is that point, where a vertical line, drawn from the centre of cavity, cuts a line passing through the centre of gravity and perpendicular to the keel. The effort of the water's power, to

sustain a vessel in an upright position, passes through the centre of cavity, and the direction of its effort is perpendicularly to the water's surface. Therefore, if a vessel is at rest and in smooth water, her centre of gravity is in the mean direction of the effort of the water which supports her. When the vessel is inclined, or *heels*, she should have a tendency, in herself, to regain her upright position ; that is to say, her centre of gravity ought to be so situated, that the effort of the vessel's weight should concur with the effort of the water to right her.

This concurrence of efforts is termed *stability* or stiffness.



Let the segment of a circle 1 2 3 represent the transverse section of a vessel's bottom ; W L, the surface of the water ; M, the metacentre, as well as the centre of motion, because this is a circle ; C, the centre of cavity ; G, the centre of gravity ; and the line 2 4, the vertical axis of the vessel which may be turned round the point M, as on a fulcrum supported by the centre of cavity. By thus simply considering the vessel as a lever in the direction of her vertical axis playing round her centre of motion, it is plain, that if the centre of gravity was placed above the point M, being the metacentre too, the vessel would upset ; therefore, that the ship may have stability, the centre of gravity must be below this point. And it may be observed, that the farther G is removed from the metacentre, or if the weight at G be augmented, the greater must be its force, as the gravity then acts with a greater length of lever.

The centres of cavity and motion (in circular bodies) will ever be in a line perpendicular to the horizon, but the centre of gravity may be either on one side or on the other of this line. When such a body is at rest, the centre of gravity will be in this line ; but, if in motion, it will be diverted from it. Thus the points M and C will always be perpendicular to W L ; but the point G, by the body's rolling, may be on either side ; for instance, at g.—While G is perpendicularly beneath the centre of motion, its action can only tend to *preserve* this circular body in her erect

position ; but, if it is removed to either side, as to g, its action is to *return* it to the erect position ; and this action increases as the distance G g, which is the sine of the angle of roll g M G, the distance M G being considered as the radius. Thus, to gain the force of gravity with any roll, as g M G, let the balance of weight beneath the centre of motion be multiplied by the sine of the angle of roll G g.

But the tendency to roll may be also diminished by the shape of the hull. For let us suppose, that the transverse section be allowed more beam and increased by the dotted lines. Now, when this vessel is rolled over, it is plain that the cavity will be augmented towards the side L ; of course, its centre must remove towards L, say to *c* ; and, if from *c* be erected a perpendicular to the horizon, it will cut the vertical axis at n, which will, in this case, be the metacentre, above which, if the centre of gravity were placed, it would act in conjunction with the centre of cavity to overset the vessel : but, as the centre of gravity is here below it at G, her stability will be increased by the increased distance of G from n, the metacentre ; and the vessel will roll round the point M as her centre of motion.

When sailing in smooth water, the greater the stability the better ; but, if a vessel with a heavy cargo, stowed low in her bottom, be sent out into a rough tempestuous sea, where every wave will throw her from her equilibrium, she will return with such violence as to endanger her masts ; and, should she be dismasted, her roll will then be with still greater force, possibly to the destruction of her hull. Were the cargo in this laboursome vessel to be removed higher up toward the centre of motion, so as to lessen her stability, she would be found considerably easier, her roll would be by such deliberate motions, as to lessen the danger to her masts and hull.

The ballast is placed round and very near the centre of gravity of the ship, because it will prevent the motion of the pitching being so hard as it would, if that weight were distant either afore or abaft that point. Whenever the sea runs a little high, the ship is never carried by a single wave ; there are generally two or three always passing under at the same time, unless when the sea is extremely long, the swells coming from a great distance, and in latitudes very remote from land : for, then it happens that the largest ships are sometimes carried by one single wave. But, in either circumstance, the ballast ought not to be stretched afore or abaft the centre of gravity, as soon as the ship is in the parallel to her draught of water marked for the ballast, an attention to which is absolutely essential. To prove this principle, suppose in either case a long or short surge, and that the water strikes the ship forward, that thereby she may be exposed to the greatest and hardest pitching : for, when the wave takes a ship under the stern, her motions, if she has a little headway, are not dangerous ; because, as she flies before the wave, she recedes, in

some measure, from its impulse ; while, in the first case, she increases, on the contrary, that same impulse in the ratio of all her velocity.

First, the ship, whose extremities are light or little loaded, being supposed to run with any velocity whatever against the wave which comes to her a-head, shocks that wave with a force expressed by the sum of the two velocities : she divides it and goes through it, at the same instant that she is raised by the vertical impulse of that column of water, which opposes to her a supporting power too considerable for her weight to displace : the wave which follows produces the same effect in receiving the fall of the ship, because the first is already under the middle of the ship, whence it passes to the stern, which is supported by it, while the second takes its place in the middle, and the third is come to support the head ; and this in an uninterrupted succession. This motion continuing thus as long as the sea is agitated, it follows that the ship is never at rest : no sooner has she been raised by a wave, but she falls again when that wave is gone, which falling is proportionably less sharp as her head is less heavy : the shake is then less violent, since she shocks the water with a less mass, which prevents her pitching so deep as she would if she were more heavy. Consequently the masting does not suffer, and the headway is less delayed, as the fullest part of the bows is not so much exposed to the shock of the water.

Secondly—When the ship is carried by one single wave, her fall is still less sharp, if little loaded a-head, than when she is carried only by the middle. She rises, therefore, more easily at the moment the other wave comes to strike her, and the shake is not so violent. Were she to plunge deeper into the fluid, it might happen that the column of water would become higher than her head, and, passing partly over it, would expose her to the danger of foundering.

In the stowing of the cargo, it is proper to place the heaviest part of the stowage as low as possible, taking care to preserve that draught of the ship which is most advantageous for her, whether she be in ballast or when laden. Those points are marked both at the head and stern : in a word, the great art of stowing lies, in endeavouring that each of the vertical parts, in which the extremities of a ship may be supposed to be equally divided, be lighter, when her lading is complete, than the weight of the mass of water they are to displace ; observing always, that the vertical parts of the middle admit of being loaded more heavily than the weight of water they are able to displace.

A mechanical method of finding the Centre of Gravity in a ship.

This method of finding the centre of gravity is exactly similar to the experimental method heretofore described for finding the

tonnage, by the construction of a model to a scale of one quarter of an inch to a foot of the corresponding parts on the ship; and care must be taken to provide the wood as light as possible. The same model will, of course, answer both purposes.

The model being accurately constructed, may be suspended by a thin line or silk, in different positions, until it points out the centre of gravity; which will be found when the block hangs in a state of equilibrium: this practice is, doubtless, very simple, but it will be found very convenient.

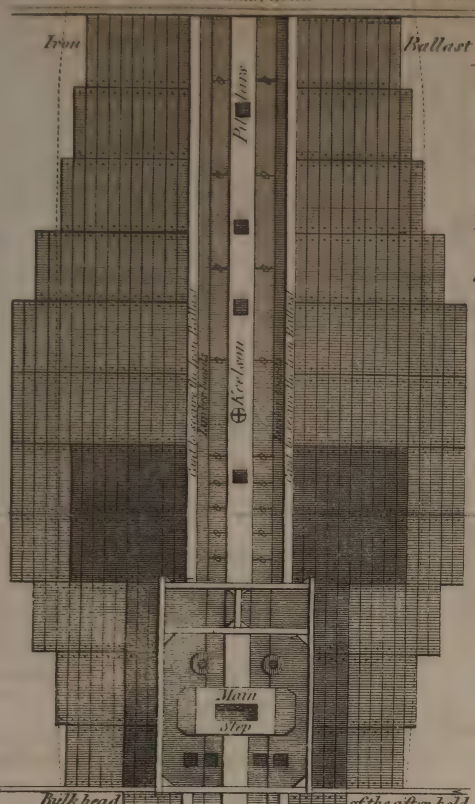
Many useful discoveries may be made by models or blocks, and with as great certainty as by the nicest calculations; for it must be allowed, that in calculating from a draught by a quarter scale, it will be liable to some inaccuracies which cannot be obviated in practice, by reason of various little alterations which may be made in laying the ship down in the mould loft; consequently, the draught and the ship will in those points disagree. And likewise, upon strict examination, we shall be enabled to find, that there are very few ships that have both their sides exactly equal in every respect.

In order to prove our block, we may suspend it by a line fastened to a hook in any part of a straight line drawn from the middle line of the stem to that of the post; this hook may be moved forward and aft to different places in the middle line, and a weight may be suspended from the upper part of the middle line on the post; if the two sides be exactly of equal dimensions and homogene, they will then be of equal weight: a plane passing through these three lines, whatever part of the middle line the hook be in, will likewise pass through the middle line of the keel, stem, and post. Therefore, if our model stands this proof, it will be as true to work from as the nicest calculations.

The model being suspended by the hook, the lines hanging at the stem and post corresponding to their middle lines, and to that which suspends the block, we may hold a batten out of winding with the line that suspends it; and, with a pencil, draw a line upon it; a plane passing through this pencil line, at right angles to the keel, and passing likewise through the line that suspends the block, will likewise pass through the centre of gravity, which, therefore, must be somewhere in this plane. Again, move the hook to some other part in the middle line, and let the block be suspended from that point; draw also another pencil line, out of winding with this last line of suspension, and the intersection of the two lines will give the height of the centre of gravity above the keel, and likewise its distance from the post and stem; and, if the hook be moved to any other parts of the middle line, and a pencil line be drawn as before, it will likewise intersect in the same point; or, let there be ever so many points assumed in the middle line, and the block suspended by each, and pencil lines drawn, they will all intersect in the same point; and, as the centre of gravity will always be in that plane which passes through the mid-

Practice of Stowing a Ship's Ballast &c. and of Stopping Gun-Shot Leaks.

A Twenty Gun Ships Iron Ballast and Ground Tier



A Ships tendency to pitch or roll may be greatly diminished by a judicious distribution of her stowage the heaviest part of it should therefore be as near as possible to the centre of gravity.

The Iron ballast is first stowed upon the foot waulings in the wake next to the cants quoiled at every inches from the timber heads & is wrought up 2 or more pigs above the floor heads in midships Two tiers of pigs are in the wake of the main hatchway & well room.

Of Iron ballast there are two sorts one of 7 the other of 21 pigs to the ton. Sloops &c use the latter only. The large pigs are 3 feet long and 6 by 5 inches square the small are one foot 6 inches long & 5 by 4 inches square. Eight or more pigs are reserved for ballasting Boats & kevelplaced conveniently for use down the main hatch way after the hold is stowed.

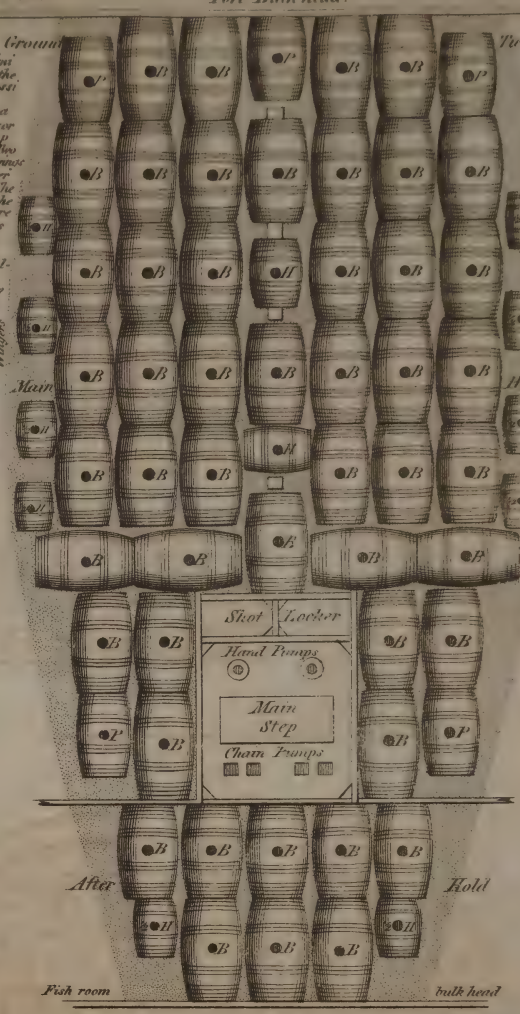
Ships having a clear run aft seldom have Iron ballast about the pump well Large Ships that have floor and futtock riders have the Iron ballast stowed lengthwise or athwartships according to y length of the chambers.

The quantity of Single ballast is discretionary It is spread and levelled over the Iron. The ground tier of water is then stowed, the Casks have their bungs upwards are wedged free from each other and are sunk ½ of their diameter into the shingle They are stowed either chine and chine or bulge and chine; beginning at the foremast or coal room bulkhead the breakage if any is made at the well bulkhead; the midship tiers fore & aft are first laid down and the sides are filled with wingers of small Casks as half Hogsheads &c which must not be raised above the level of the tier or they will cause a breakage in the tier above which is stowed in the line of the ground tier. The stowage is thus continued for as many tiers as will be sufficiently clear of the beams, a proper quantity of shingle being laid between every tier.

Abreast the well over the ground tier are stowed wet provisions; above the ground tier in the after hold are stowed dry provisions and between the Casks are wood & shingle ballast. The fish room will commonly take one longer of pipes in Store stowed some of the Spirits and Wine; sometimes Casks in the spirit room are the Wine and Spirits for the Ships use.

*** In Merchant Ships the various Casks package &c must be wedged off from the Bottom sides pump well &c.

Fore Bulk head.



Mr. Hill's invention for Stopping Leaks, occasioned by Gun-shot holes.

This invention consists of a circular piece of Elm from 2 to 4 Inches thick end of a circumference sufficient to cover the shot hole. The outside carved and the inside somewhat concaved, to be lined with several folds of Flannel or Kersey dipped in warm Tallow. Through the Centre of this Piece of Elm and Flannel is a hole for a Rope to be passed through from 2 to 4 In.s in Circumference and about Six Feet long with a double-wall-knot on the outside end. tapered and served to an eye at the other end. The whole is thus used. From the inside of the Vessel is thrust through the Shot Hole, Spun yarn, or small Line, of a sufficient length to float on the Water, the inner end being retained on Board, the outer or floating one is taken up, & fastened to the eye in the tapered Rope, the Spun yarn is then hauled upon, until the stopper covers the Shot hole, and if a greater strain is wanted to press the Flannel round the edges of the hole, a Tackle must be used.

NB. Should the Shot hole not be sufficiently clear to admit the Spunyarn through it, an auger must be used.

Section of the Hold as stowed in Midships

Scale of Feet

1 2 4 6 8 10 12 14 16

Dimensions &c of Casks used in Victualling

Casks	Length	Diam.r of the Bungs & Thwt		Contents in Gallons of Wine or Beer	Pieces of Beef 200 lb.s each	Pieces of Pork 200 lb.s each	Flour	Peaze	Oatmeal
	F.I	F.I	F.I	N.o	N.o	N.o	lb.s	Gall.s	Gall.s
Leager	4.6	3.0	2.5	150					
Butt	4.1	2.8½	2.2	108					
Puncheon	3.5	2.0½	2.1	72	170	310	672	76	
Hogshead	3.0	2.3	1.10	54	124	220	448	6.4	8.4
Barrels	2.7	2.0	1.11	36	86	151	336	4.8	7.2
Half Hogs.d	2.4	1.11	1.7	28	64	120	224	3.2	4.0
Pipes	4.1	2.11	2.1	for Wine					
Breakers	2.0	1.1	0.10						
	large	deep							
Tubs	3.1	3.0							
For Sails	4.7	2.0							

Gang Casks is a name given to small Casks as Barrels &c

Victualling Measures.

One leager and a half is one Ton and 9 Gallons
Two Butts are one Ton
Three Puncheons are one Ton
Four Hogsheads are one Ton
Six Barrels are one Ton
Eight half Hogsheads are one Ton
216 Gallons are one Ton of Beer

Ballast allowed to the following Ships

Guns	Ton nage	Iron Tons	Shingle Tons	Guns	Ton nage	Iron Tons	Shingle Tons
110	2290	180	370	36	370	65	160
100	2090	180	370	32	700	65	140
96	2110	160	350	28	600	60	100
90	1870	160	350	24	500	50	80
80	1620	140	300	22	450	50	70
74	1700	80	270	20	400	50	60
64	1370	70	260	Sloop	300	30	40
50	1100	65	170	Brig	160	20	45
44	900	65	160	Cutter		30	Seldom
38	930	70	170	Sloop		15	any

Contractions Explained.

B. Butt.
b. Barrel.
bs. Breakers.
H. Hogshead
½ H. Half Hogshead.
P. Puncheon.

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dle line of the keel, stem, and post, it may with certainty be marked.

This will certainly require the utmost nicety; but, if well executed, will agree with that found by calculation, provided the dimensions be taken very exactly, and likewise from a true scale of equal parts.

Having now investigated the centre of gravity, so far as is consistent with our present purpose, and laid down all that is requisite to be attended to in that respect, we shall proceed to offer some remarks on the practice of stowing ballast.

The practice of stowing Ballast, &c.

In the royal navy, the iron ballast is first stowed fore and aft, from bulkhead to bulkhead in the main hold, next to fir cants nailed on the limber-strakes on each side of the kelson, five or more inches clear of the limber-boards; and is winged up three or more pigs above the floor-heads in the midships, or bearing part of the ship, and there are two tiers of pigs in the wake of the main hatchway and well-wings. Ships, built with a very clean run aft, seldom have any iron ballast stowed abaft the pump-well or after-hold. Ships, that have floor and futtock riders, have the iron ballast stowed, either lengthways or athwart-ships, agreeably to the length of the chambers, which are the clear spaces between the riders.

The shingle-ballast is next spread and levelled over the iron ballast, on which is stowed the ground tier of water; bung up and bilge free from the sides, either chine and chine, or bouge and chine, beginning at the coal-room bulkhead, that being the foremost, and making the breakage, if any, at the main hatch: the midship tiers, fore and aft, are the first laid down, and the casks are sunk about one quarter of their diameter into the shingle; the sides are filled in with wingers of small casks, as half-hogsheads, gang-casks, or breakers; observing not to raise the wingers above the level of the tier, to cause a breakage in the next tier above, which is stowed in the cuntline of the ground tier: bung up and bilge free; and so on, for as many tier as can be stowed sufficiently clear of the beams.

In the after-hold, between the aft-side of the pump-well and fish-room bulkhead, are stowed the provisions above the ground tier: between the casks, billet, or other wood, and shingle ballast.

In the fish-room are stowed some of the spirits, or wine, and sometimes coals; and, in the spirit-room, are stowed the wine and spirits for the ship's use.

In the merchant-service, the stowage consists, besides the ballast, of casks, cases, bales, boxes, &c., which are all carefully wedged off from the bottom, sides, pump-well, &c. and great attention paid that the most weighty materials are stowed nearest to

the centre of gravity, or bearing of the ship; and higher or lower in the hold, agreeably to the form of the vessel. A full low-built vessel requires them to be stowed high up, that the centre of gravity may be raised, to keep her from rolling away her masts, and from being too stiff and laboursome; as, on the contrary, a narrow high-built vessel requires the most weighty materials to be stowed low down, nearest the kelson, that the centre of gravity may be kept low, to enable her to carry sail, and to prevent her oversetting.

By the 19th Geo. II. it is enacted that if, after June 1, 1746, any master or owner, or any person acting as master of any ship or other vessel whatsoever, shall cast, throw out, or unlade, or if there shall be thrown out, &c., of any vessel, being within any haven, port, road, channel, or navigable river, within England, any ballast, rubbish, gravel, earth, stone, wreck, or filth, but only upon the land, where the tide or water never flows or runs; any one or more justices for the county or place where or near which the offence shall be committed, upon the information thereof, shall summon or issue his warrant for bringing the master or owner of the vessel, or other person acting as such, before him, and, upon appearance or default, shall proceed to examine the matter of fact, and upon proof made thereof, either by confession of the party, or on view of the justice, or upon oath of one or more creditable witnesses, he shall convict the said master, &c., and fine him at his discretion for every such offence any sum not exceeding 5*l.*, nor under 50s., &c.: and, for want of sufficient distress, the justice is to commit the master, or person acting as such, and convicted as aforesaid, to the common gaol or house of correction, for the space of two months, or until payment of the penalties.

Besides the above general act relating to ballast, there are the 6 Geo. II., c. 29, and the 32, Geo. II., which regulate the ballasting of merchant vessels in the river Thames, placing it under the direction of the corporation of the Trinity-house.

Manner of getting on board and stowing the Anchors and Cables.

Anchors, though they bear different names on board of ships in the royal navy, as sheet, best bower, small bower, and spare, are of the same weight. The stream and kedge anchors are smaller, and grapnels are for boats.

Ships of 110, 100, 98, and 90 guns, have 7 anchors; from 80 to 20 guns inclusive, 6 anchors; ships of 300 tons and sloops have 5; and brigs and cutters, 3 anchors.

In fitting out ships, the anchors are brought in craft near the bows, being most convenient to the hawse-holes, through which the cables pass to be clenched.

The *bower-anchors* are first catted; which is performed by hooking the hook of the cat-block into the ring of the anchor, and

bowsing upon the fall that leads in through a snatch-block on the forecastle; the cat-falls being previously reeved through the sheaves of the cat-head and cat-block, keeping the hook of the cat-block downwards and its point inwards. They are then fished, by means of the half-davit, pendent, and tackle, thus: the davit is stepped in the channel on the side wanted, and supported by guys; the masthead-guy goes over the end of the davit, with an eye. The other end fastens round the fore-masthead, with a round turn and two half-hitches. The foremost end of the guy goes over the end of the davit; the other end fastens round the cat-head, with two half-hitches, and is securely stopt. The after-guy goes over the end of the davit, and makes fast with two half-hitches, through an eye-bolt in the after-part of the fore channel. At the outer end of the davit is hung, by its strap, a large single block; through which is reeved the pendent, with a large iron hook spliced in the lower end, to hook the anchor within the flukes; then, to the inner end of the pendent, is made fast a tackle, by thrusting a toggle through an eye in the block-strap: after that has passed through an eye in the pendent, the other block of the tackle is hooked in an eye-bolt in the fore part of the quarter-deck; the effort of the tackle is communicated to the hook, by means of the pendent, by men's bowsing on the tackle-fall. Thus the flukes of the anchor are raised and placed on the gunwale, where it is made fast by the shank-painter chain. That the flukes may lie level, the stock is bowsed upon by the anchor-stock tackle, the double block of which is hooked to a selvagee, fastened round the stock of the anchor under the first hoop, and connected by its fall to a single block, hooked to a selvagee fastened round the lanyard of the main-stay: the fall leads in upon the forecastle.

The *best bower* is then placed forward near the bows on the starboard side, the *small bower* near the bows on the larboard side, a little abaft their respective cat-heads, and are secured by their stoppers, from the cat-heads and shank-painters. The stopper has one end clinched round the cat-head; the other end passes through the ring of the anchor, returns upwards, and leads over a large thumb-cleat bolted to the cat-head, and is made fast with several turns, and the end hitched round the head-rail and timber-head, on the fore side of the cat-head. The shank-painter hangs the shank and fluke of the anchor to the ship's side outboard; and, when stowed, the shank-painter is passed under the inner fluke round the shank of the anchor, and made fast with two or three turns, and the end stopped round timber-heads on the forecastle. With these two bower anchors ships are generally moored when lying in a tide's way or in a fleet.

The *sheet* and *spare anchors* are hoisted by runners and tackles, main-stay and yard tackles, and are stowed securely with stock and bill lashings at the after-part of the fore shrouds, before the chess-trees on each side of the ship, with one of their arms

resting on a chock, bolted to the gunwale; the stock being bowsed-to by the anchor-stock tackle. The sheet-anchor is stowed on the larboard side, and is the first resource in a gale of wind, after parting with either of the bowers; for which reason, when in port, the sheet-cable is kept bent, and the anchor is over the side, suspended by the stopper and shank-painter, ready for cutting away in case of necessity. The spare anchor is stowed on the starboard side, and is seldom used, but when one of the others is lost.

The *stream anchor* is stowed on the spare anchor; and, when used, it is sent in the long-boat or launch, with its cable bent, and let go at any particular spot, either for steadying the ship, when riding by only one bower, or to assist a ship when in shore, or to warp her, &c.

The *kedge* is stowed on the stream and spare anchors, and is frequently used to stop a ship for a tide in little winds; but, if the wind is too powerful for the kedge, the stream anchor is substituted. The kedge is sometimes used, in moderate weather, to warp the ship so as to shift her birth.

The *cables* also are brought in craft alongside; and, should they be new from the ropewalk, let them be coiled down in the craft, the same way they are to be coiled on board.

It is recommended to merchant ships, especially of the smaller size, that their cables should be coiled the way they bit, or the way they run round the windlass; and their tiers should be on the side opposite to that on which they lead. But this practice cannot be approved of for the royal navy, nor is it indeed there adopted; because, when heaving in upon one cable, and veering out upon another, the cables, by being crossed, are apt to foul in the hatchway. The best bower, which is mostly the working cable, should lead foremost up the hatchway on the starboard side; then the small bower on the larboard side; and, afore the latter, the sheet; which, being the least used, can be triced close round the fore-part of the hatchway, out of the way.

A cable generally grinds or kinks from more turns being forced into it by the coiling than it had when first made; and the only way to get rid of those grinds or kinks is to coil the cable across the hatchway, from side to side, in large flakes, with the sun; then take the upper end through the coil, and coil the cable down in the tier the way required. By these means, as many turns will be taken out of the cable as there are flakes coiled round the hatchway.

It should be a rule in coiling cables, never to lay out near the hatchway, but to keep that part of the tier as low as possible, that the bends may have sufficient room to upset.

Were all store-cables first coiled down from the ropewalk against the sun, they would be better adapted to coil on either side of the ship; for a cable coiled against the sun will more

easily reverse, and have less grinds or kinks in it than a cable coiled with the sun.

Anchors (except when at sea) should always have a cable clinched to the ring ready for letting go, and a buoy-rope with a buoy.

To *Clinch a Cable ;* run it through the hawse-hole and the ring of the anchor three or four fathoms in length ; then haul the bight up in the head, and pass the end of the cable over the bight, and through the ring, between it and its own part : pass then the cable-bends, and cross them with strands, well greased, one at the end and the other about one foot from the end ; and be careful not to form the clinch larger than the ring of the anchor.

From the *Moorings* a ship, when fitted, removes, in order to take in her guns and proceed to sea ; but, before she finally sets sail, she generally comes to anchor, and is moored once with her own anchors and cables, which will be treated of hereafter. At present it is sufficient to give the following cautions at

Getting Underway from River Moorings.

If it be in a tideway and with a leading wind, so that the ship can stem the tide, let it be a rule, when the tide serves, to get underway, and sail against the flood ; which gives time to clear a ship of her moorings, and affords a more powerful effect to the helm, to steer the vessel clear of other ships and any particular danger.

OF BENDING SAILS.

To bend a Course in fair weather.

Stretch the sail athwart the deck, the starboard-side of the sail to the starboard-side, the larboard to the larboard-side ; then bend yard-ropes to the ear-ring cringles, and make fast the head ear-rings a few feet up on the yard-ropes. The bunt-lines, leech-lines, clue-garnets, and all the geer bont, make fast a rope-band to each bunt-line and leech-line leg, that the men may be enabled to catch the head of the sail from the yard. Now, man well the yard-ropes, bunt-lines, leech-lines, and clue-garnets, and run the sail up to the yard. The sail aloft, send the hands up to bring it to, and let them haul out the weather ear-ring first, then the lee ; and, if it is a new sail, let them ride the head-rope to stretch it. The sail being hauled square out upon the yard, make fast the rope-bands, keeping the head of the sail well upon the yard.

To bend a Top-sail in fair weather.

Overhaul the leeches of the sail, put in the ear-rings, bend the bowline-legs, lay out the clues, and open them if necessary, and make the sail up snug again ; then round down upon the lee top-sail-haliards till the weather fly-block is high enough to bring the sail up over the guard-iron : then rack the tie over to the weather rigging. Now pile the sail upon slings, with the lee side uppermost ; hook on the topsail-haliards, and run the topsail up into the top ; then stretch the sail round the fore-part of the top, bend the jeer, and make fast the head ear-rings a few feet up on the reef-tackle pendents, with a rope-band or two to each bunt-line leg. The jeer being bent, man the reef-tackles, bunt-lines, and clue-lines, and haul out the sail. Now let the hands lay out upon the yard, and haul out the weather ear-rings first ; then haul out to leeward, and ease off to windward till the sail is square, when make fast the rope-bands, keeping the head of the sail well up on the yard.

OF GETTING UNDER SAIL.

General observations relative to getting under sail.

Whenever a ship is preparing to get under sail, the topsail-yards ought to be at the mast-head, and her sails stopped with rope-yarns. And indeed all persons that pique themselves on rapid execution ought to observe this precaution when the wind is not too powerful.

When the tide takes a ship on the beam, and she is to cast the other way, it is evident that the tiller in the first instant must be put on the side from which the current runs, because the rudder will be in such a situation as to receive very obliquely the impulse of the fluid, and consequently will but little oppose the ship's falling off, provided the ship's velocity does not exceed that of the current.

When in a situation where it is indifferent whether the ship be cast one way or the other, always, let it be to leeward of the anchor, that there may be no risk of its getting foul of the cut-water.

It happens sometimes, in getting under sail, that you are obliged to heave the anchor up to leeward ; which often requires a dangerous strain to the capstern ; because the ship, driving to leeward as soon as the anchor is a-weigh, causes the cable to girt against

the lee-bow, and the stock of the anchor is very apt to catch the cut-water. To avoid this, let the ship, (if you are near the land,) get offing enough to wear and bring the anchor on the weather-bow: then the ship, lying to leeward of the anchor, or standing-on under an easy sail, drifts, and consequently leaves the anchor disengaged to windward; in which situation it may be hove with facility.

TO GET UNDER SAIL WHEN THE SHIP IS SWINGING HEAD TO WIND, AND YOU WANT TO CAST EITHER TO STARBOARD OR LARBOARD, IN A PLACE WHERE THERE IS NO CURRENT.

To cast to Starboard.

Heave short on your anchor till it is a-peak: then haul in quite home the larboard-braces forward and starboard-braces abaft: loosen, sheet-home, and hoist, the topsails; should they not be so already: put the helm a-starboard, and heave till the anchor is a-weigh. The moment the anchor quits the ground, the ship will begin to fall off to starboard. As soon as this movement is perceived, hoist the jib and fore-topmast stay-sail, if necessary, to help her: and when she has sufficiently fallen off, her sails abaft (which are trimmed sharp for the larboard tack) will fill. But, unless for very superior reasons, you had better continue lying-to till the anchor is catted, taking care to haul the mizen-sheets close aft, if the ship be inclined to fall off too much.

To cast to Larboard.

Haul in the starboard-braces forward and the larboard aft, and put the helm a-port. The rest of the operation is the same as the preceding; and will be equally proved in the following demonstration, by only changing starboard for port.

Demonstration.

You heave short before the topsails are loosened, in order to facilitate the working of the capstern, which would require dangerous efforts if they were set; since they would be a-back, and consequently in a situation to send the ship a-stern; whereas she should go a-head when you are heaving on your cable. The larboard braces are hauled in forwards, because in that situation the sails are so braced as to cast the ship's head to starboard, since they make with the keel the most acute angle possible a-starboard forward, and are at the same time a-back. Besides, the after sails, being braced sharp up to starboard, are also taken a-back like the others, and receive the wind in such a manner as to turn the after-part to port. So that there are always two powers acting in contrary directions, one before and other abaft the centre of gravity

of the ship ; the one forcing the fore-part to starboard, and the other impelling the after-part to larboard. As these two effects cannot happen without the ship's going a-stern the moment the anchor quits the ground, since she is no longer withheld by any thing, and is moved by an exterior power, the fluid, which carries her in this direction, part of the effect of her sails giving her sternway, (§ 21.*) ; it follows that the helm must be put to starboard, that the rudder may help her after-part round to larboard, (§ 53.*) Thus every thing is disposed to make the ship fall off to starboard. The jib and foretopmast stay-sail are not added, unless there be reason to fear the ship will not fall off fast enough ; and, when you find she has sufficiently done so, the mizen is to be hauled out, to procure the contrary effect, and thereby to counterbalance the jib and stay-sail, which it is very often necessary to keep set.

To get under sail when the Ship is riding Head to Wind and Tide.

If a ship, riding head to wind and tide, wanted to get under sail, after having decided on which side it is best to have her cast, it must be performed according to one of the foregoing methods, except with regard to the helm, which must be put to starboard, either before the anchor loosens, or while it does, if you wish to cast to port ; because the water, coming from forward, acts with the same force on the rudder as if the ship went with the current, impelling the rudder to starboard and the head to port. Therefore it is evident, in this case, the helm ought to be put to starboard ; which, on the contrary, would be put to larboard, were the ship to be cast to port.

If the ship, after the anchor is out of the ground, goes a-stern faster than the current runs, the helm must then be used as if there was no current, because the excess of velocity, whereby the ship exceeds that of the water, acts upon the rudder.

If it blow fresh, so that you cannot set your topsails without reefing them, let that be done before they are sheeted home ; and if it blow so hard as to be obliged to go only under a foresail, it would be then sufficient to loosen the fore-topsail, without sheeting it home, after having braced it quite close on the side opposite to that you want the ship to cast ; not forgetting, however, to put the helm the same way as you cast, as soon as you perceive the ship going a-stern : and when the ship has fallen off sufficiently, then is the time to fill and trim the foresail.

* These figures refer to the sections of the THEORY, which will be found in preceding pages.

To get under sail when the Ship is swinging with her Head to the Current, and with the wind a point abaft the beam.

The topsails being stopped with rope-yarns, let them and the mizen-topsail be hoisted, and properly trimmed, as if they were set; and, when every thing is properly disposed, heave short on your anchor till it is a-peak; next to this, loosen, sheet home the foresail and mizen-topsail, keeping the wind in, and heave vigorously at the capstern till the anchor is a-weigh. At the same time hoist the jib and fore-topmast stay-sail, or haul out the mizen, according as circumstances may require. Whether you wish to come to windward or fall off more quickly, you must still continue to heave round the capstan briskly to get the anchor up, till you find yourself sufficiently offward to bring to, in order to stow it with ease, or to stand on under an easy sail with the anchor hanging out to windward, if the situation of things will admit of it. You may sometimes also hoist up both the main and fore-topsails, as soon as you get ready; but, in certain cases, as when obliged to make the best of your way from an enemy, every sail possible must be set at once which the weather will admit of; especially when obliged to haul by the wind: in which case, the anchor must be got up and catted as well as it can: there are cases even when, without losing your time in weighing it, you crowd as many sails as you possibly can, and depart in cutting or slipping the cable.

Demonstration.

The topsails and mizen-topsail are hoisted up, because the sails in that situation are more easily sheeted home and trimmed; and because, as soon as the ropeyarns are cut, the sails fill, and give the ship headway, the moment the anchor quits the ground. The mizen-topsail is used to make the ship steer well, by keeping it either filled or loose to the wind, according as the ship is griping or the contrary.

To get under sail with a Spring.

If a ship be in a place too confined to cast under her sails only, or being obliged to put to sea in a gale of wind, without hoisting the anchors; you must, for greater safety, in casting the right way, get a spring out, to be clapped on the cable by which the ship swings, by passing a hawser or a stream cable through the aftermost port, on the opposite side to that you mean to cast; and after that spring is well hove tight at the capstan, hoist the jib and fore-topmast stay-sails, loose and sheet home the fore-topsail; when that is done, and if the weather permits, brace quite close the head sails on the same side with the spring. When this is executed, slip or cut the cable, heaving briskly at the same time

on the spring, till the ship has paid off sufficiently. Then fill the sails, by setting the mizen-topsail and every other sail you mean to employ, and slip or cut the spring, as circumstances may require. Care must be taken, not to let the ship fall off too much before the spring is cut; because, having no way through the water, she will not come to the wind so soon as might be wished; and, for the same reason, the spring must not be cut till she has fallen off as much as is necessary: because, although she has no other motion but that of falling off, the vessel might perhaps not wear enough to answer the purpose.

Demonstration.

As the reasons have been shown before why the head sails are braced up on the opposite side to that on which the ship casts, they need not be repeated here. Although we suppose the wind so strong as to keep the ship wind-road, it may be proved that the ship turns almost on the middle of her length; since the moment the fore-part begins its movement of falling off on one side, the after-part makes another to approach the point from which the head is receding. Now she turns so much the more surely on her centre, and her evolution is so much the more rapid, as the force used in heaving at the capstan is stronger: because the more powerful the heaving is, the more of the hawser comes in, and consequently the more easily and with the greater rapidity will the after-part approach the point the head of the ship has left.

When she has fallen off enough, slip the spring, because she gathers head-way in proportion as the sails are filling, and in that case the hawser would only hinder the ship going a-head, or cause her to fall off more, which would be equally prejudicial. The hawser or stream-cable is passed aft as far as possible; because, being at the extremity of the ship, the capstan strains less, and the vessel turns with more celerity.

If this operation is performed when it blows hard, you must not sheet home the fore-topsail: for, if the wind is absolutely too strong, you must only loosen this sail, and hoist the fore-topmast staysail: but, if the weather is pretty tolerable, it will be found sufficient to sheet home the fore-topsail without hoisting it.

To get under sail with a Leading Wind in a Tide-way.

If the ship to be got under sail has a leading wind, and is in the midst of vessels, or in a narrow channel, where it would be difficult to cast her upon the lee-tide, she should be got under sail before the weather-tide is done. Thus the casting of the ship would be avoided, and she may be steered through the fleet or channel with safety.

Should it, however, blow so fresh upon the windward-tide, as to force the ship end-on with her cable, it will be impossible to heave

it in, without sheering the ship over from side to side, and heaving in briskly, as the ship slacks the cable ; but, as this is attended with much danger, by the ship suddenly bringing up on each sheer, it will be best to heave a-peak upon the first setting of the windward-tide, before the ship swings, to bring the wind aft.

To cast a ship upon the Larboard Tack, and back her a-stern of danger.

We suppose the ship to lie at single anchor, with the wind and tide the same way, and ships or shoals right a-stern, in the intended course, and that, to clear them, you must cast upon the larboard-tack, and make a stern-board.

Make every thing as ready as possible before weighing : let the three topsails be hoisted, the yards braced up sharp with the larboard-braces, and the mizen hauled out. Thus situated, when the anchor weighs, put the helm a-port. The tide, running aft, acts against the starboard side of the rudder ; and, in that direction, it will cast the ship the right way, and bring the wind upon the larboard-bow. The wind may be thus kept, at pleasure, by the helm, till the ship begins to get sternway through the water, which should be attentively noticed, to put the helm hard a-port. the wind, being on the larboard-bow and the topsails a-back, will soon give the ship sternway through the water ; then the water will act against the larboard-side of the rudder, and powerfully prevent the ship falling too fast off from the wind. Thus she will drive till the anchor is got quite up, and may be so continued till she has past the shoals, and has room to veer, and get upon her proper course.

It is advantageous to make a stern-board in getting under way from a single anchor in the above situation. The anchor heaves up more easily when the ship goes a-stern ; and, while heaving up, it serves to keep the ship's head to the wind. A ship, however, cannot long be steered stern foremost when under sail so as to keep the wind before the beam ; but she will in a little time drive broadside through the water, till she gets headway, and then it is proper to veer, provided the anchor be quite up.

To cast a ship on the Larboard Tack, in a Tide-way, with the wind two points on the starboard-bow.

A ship riding in a tide-way, with the wind two points on the starboard-bow, and so near the shore, on the larboard-side, that she must be cast upon the larboard-tack to clear the shore, the *three* topsails must be hoisted, and the yards sharp braced up, with the larboard-braces forward, and the starboard-braces aft, with the starboard fore-top bowline well hauled, putting the helm hard to port at the anchor's weighing : the tide acting upon the rudder, and the wind upon the sails *braced in that direction*, brings the ship

about with the wind on the larboard-bow, before she gets sternway, which should be always strictly noticed ; for, in all proceedings of this kind, if a ship gets sternway before she brings the wind right a-head, she will not come about the right way. In that case, it is best to veer away the cable directly, and bring the ship up again : and carry out a kedge or small anchor on the larboard-bow hauling its *cable* or hauser in tight, on the larboard quarter, when the bower-anchor is a-peak. If this fail, the ship must lie till the windward-tide makes, to bring the wind on the larboard-bow, when the ship may be got under-way, and clear the shore.

To cast a ship upon the Larboard Tack, and shoot her by the wind a-head of danger.

If there is but just room enough close by the wind to clear a danger lying to leeward, much depends on heaving up briskly the anchor after it is out of the ground, and having proper sails ready to set to the best advantage. The three topsails must be hoisted and the yards sharp braced up with the larboard-braces forward, and the starboard-braces aft, when the anchor is at a long peak. At weighing the anchor, put the helm hard to port, then the action of the tide upon the rudder, and the wind on the fore-topsail, will cast the ship off the right way, so as to fill the after-sails, when the fore-topsail may be soon braced about and filled before she gets sternway. The helm will keep the ship under command sufficiently to steer her by the wind a-head clear of danger ; but, if the ship gets sternway in casting, the helm should be kept hard a-weather to prevent her falling off too much from the wind ; and, when she gets headway again, be cautious how the weather helm is eased with the anchor much below the bows, by which the resistance forward is increased, and the ship may be brought up in the wind, so as to prevent her shooting clear of the danger. This must be guarded against by the weather-helm, and head-sails, as jib, fore-topmast-stay-sail, &c. As soon as the ship has shot far enough a-head to clear the danger to leeward, and there be but little room a-head, it is best to bring the ship to and drive with the helm a-lee, with the main and mizen topsail a-back, and the fore-topsail shivering till the anchor is up : then take proper time to veer.

To cast on the Larboard Tack, when riding with the wind right a-head, and to veer her short round before the wind in little room.

The head-sails should only be loose, viz: the fore-topsail hoisted and the fore-sail loose : brace sharp up with the larboard-braces, the jib and fore-topmast staysail set, with the larboard sheets flat aft. When the anchor is a-peak, and a lee-tide running, at weighing the anchor, the helm should be put to port so far as

to bring the wind two points on the larboard-bow, which should be kept so by steering the ship till the tide ceases to run aft. Then put the helm hard to starboard, or a-lee; and, when the ship gets sternway, the water will act powerfully on the starboard, or lee, side of the rudder, turning the ship's stern to windward, whilst the wind, acting at the same time upon the head-sails a-back, will box her round off upon her heel, so as to bring the wind nearly aft by the time she loses her sternway. Then the ship will cease falling off and soon get head-way, which should be attended, and the head-sails braced about flat with the starboard braces, and the helm shifted hard to port at the same time.

When there is no tide but still water, at weighing the anchor, the helm must be hard to starboard; and, as the ship gets sternway, the water meets with so much resistance against the starboard-side of the rudder in that direction, that the rudder acts with great power to turn the ship's stern round to port, and the head-sails being set and trimmed as before-mentioned, and the foresail let fall with the starboard-bowline hauled close forward, will assist to cast the ship so far round the right way, by the same time she loses her stern-way, as then to permit your proceeding as before-directed. To ensure success, heave the anchor up briskly. The same methods are adopted in casting the ship on the starboard-tack, only the helm and sails are managed the contrary way.

Preparations necessary to be made for Anchoring.

On approaching an anchorage, the anchor and buoy are got clear, and a range of cable stretched along the deck suitable to the depth of the water. Care should be taken that nothing is in the way to check the cable, or stop its running out: then at a proper distance, a turn is taken round the bits with the cable, thus: First pass the cable from the anchor underneath the cross-piece, then take up a bight of the cable abaft the bits, and throw it over the bit-head. The end of the cable is clinched round the orlop-beams in the royal navy, and round the main-mast in the merchant-service.

It is necessary to have water near the bits to prevent its firing by friction. Stoppers and ring-ropes of all kinds should be ready for use.

The stock-lashing being cast off, and nothing but the anchor-stopper and shank-painter retaining the anchor, men are stationed by them, who let go at the moment ordered.

To secure the cable when out, DECK-STOPPERS are thus previously prepared: They are turned into the ring-bolts on the deck round a large iron thimble, and fastened with a throat and end seizing. Each stopper has a laniard spliced round the head, un-

der the knot, by which several turns are taken round the cable, and the end stopt.

Besides the deck-stoppers, others are used as an additional security to the cable ; such are the BIT-STOPPERS, &c.

BIT-STOPPERS. Each stopper is reeved through a hole in the standard knee, against the fore-part of the riding-bits, and is turned-in or spliced. It has a laniard spliced round the head, under the knot. When used, several turns are taken with the laniard round the cable, and the end stopt. It is to check the cable in bringing up the ship. Another bit-stopper much approved of is about four fathoms long, and tailed out like a nipper at one end, and knotted at the other. Let this stopper be rove through the whole in standard knee. To pass it, let it be held aft, inside, over the cable, and under the bits, outside the cable ; then worm it round the cable before the bits. Then, as the cable runs out and it is required to check the ship, haul tight the worming ; and by the cables drawing forward, it will tighten the stopper, and bend the cable so close to the bits as effectually to bring the ship up. This stopper is not likely to jamb, therefore, is extremely well calculated for bringing a ship up with ease ; as, by slacking, and hauling tight the worming, the cable may be suffered to run out, or be checked at pleasure.

In heaving up in a heavy sea, when, by a sudden pitch of the ship, the messenger or nippers give way, this kind of stopper will be found extremely serviceable ; for, upon these occasions, this stopper may be always passed ready, and the bight triced up abaft the bits with a rope-yarn clear of the cable.

Another bit-stopper, made with a large eye, that it may be thrown over the bit-dead, and shifted over from side to side, is also much approved.

DOG-STOPPERS. One end is clenched round the main-mast, and the other end wormed in the cuntlines of the cable, and stopped in several places ; then brought back with several turns over its own part, and the end stopt. It is of little service, unless it be long enough to clap on above the coamings.

WING-STOPPERS. One end is clenched round the orlop-beams in the wings, and the other end is clapt on as the dog-stopper.

RING-ROPES are occasionally made fast to the ring-bolts in the deck and to the cable, by passing the ends through the ring of the bolt, and through the bight, then clapt on the cable with cross turns, and the ends stopt. Ring-ropes may be better single than double ; they are passed with less confusion of turns. To pass a single ring-rope, and have it in readiness to check upon veering away the cable, take also three slack turns through the ring-bolt and round the cable, one before the other, and hold up the parts fair ; then take as many slack turns of worming round the cable, before the ring, still holding up the parts fair, and leaving sufficient room for the cable to pass through. When the cable is to be

checked, haul tight the worming; and by the cable's running out, it will readily draw the turns tight through the ring, and bind the cable so close to the ring, as to prove an excellent stopper. Ring-ropes are similar to the laniards of stoppers, to check the cable when freshening the hawse, or to add security to the stoppers in a heavy sea.

Lengthening of cables. Cables are lengthened by splicing one to the end of the other, thus: The closest and best method is to put the ends in twice each way; then, to pick out the strands, and worm part of them round the cable, and taper away the rest; which should be closely marled down, and a good throat and end seizing clapt on of six-thread ratline.

The strands of the best bower and stream cable had better be pointed, that these cables may be more quickly spliced and unspliced in cases of necessity.

To prevent cables from chafing by friction in the hawse, and against the stem or cutwater, they are rounded or served thus: They should be served against the lay. The most expeditious way of clapping on rounding is with a top, where room to work it will admit; otherwise it must be beaten on with mallets; and care taken to stop the service with spun-yarn at every six or eight turns.

Mooring-services are clapped on about fifteen fathoms from the end or cable splice. Large vessels should have twelve or fourteen fathoms of service, half of it rounded, and the rest plaited and keckled. Upon the best bower or working cable, there should be a short service of eight or ten fathoms at the half cable.

Mats of the width of the cable's circumference, and about three fathoms long, are very convenient to have ready to lace on the cable with expedition, in cases of necessity, in the way of the hawse or cutwater.

The best service to prevent a cable's chafing is cut from a tanned horse-hide, big enough to wrap two or three times round the cable. The method of putting it on is, first to parcel the cable with two or three turns of old canvas, the length of the leather service; which, if too stiff to put on, only requires dipping in water and beating, which makes it soft and pliable: then pass it tight and smooth round the canvas, and stop it on with sennit or three-yarn knittles, well greasing them, and the service, before veering it into the hawse-hole. Avoid raising the surface of the leather by knittles, &c. underneath the canvas.

Of coming to Anchor.

A ship ought always, unless under some particular circumstances, to be brought to anchor under an easy sail, such as the three topsails, jib, or fore-topmast-staysail, and sometimes the

mizen, according as the vessel has more or less inclination to fall off or come to the wind.

There are, no doubt, cases when more sail may be required; but they are exceptions to and do not destroy the general principle. Nor should an anchor ever be dropt to leeward of the place you mean to bring up in; because that would often occasion a necessity of casting two anchors at once, for fear of dropping still more to leeward.

When the wind is so violent as to bring the anchor home, and make the vessel drive, the cable is veered away; and, in veering away, the turns of the stopper-laniards are slackened, and a portion of the cable suffered to go out of the hawse, to let the vessel farther a-stern of her anchor; in which situation she bears less strain on the flukes, and is less liable to drag the anchor; for, the more cable is out, the flukes become deaper buried, and the ship rides in greater safety.

In letting go an anchor, great care should be taken that the water be not so shoal as to endanger the ship hurting herself upon it, and that the anchor be not fouled by the cable getting about the fluke or stock.

Nor should the water be too deep, because the cable when out, should approach as near as possible to a horizontal direction. Indeed, this principle is so true, that three cables spliced together, an-end of each other, are kept bent to the best bower-anchor, to be used in cases of necessity; and it is found that one good anchor, with a long range of cable, is a safer anchorage than two anchors with short cables. However, when the ship has not room to drive, and if the night be dark, let fall a second anchor under foot, with a range of cable above the deck. At all events, the deep-sea lead should be thrown over the gunwale, and the line frequently handled, to be certain that the ship does not drive.

In hard and rocky bottoms, where anchors cannot have much hold, cables are chafed and cut to pieces. When constrained to anchor in such places, a chain should be run up the cable from the ring of the anchor to a certain distance, to secure it from danger. When a chain is not to be had, (although the top chains may serve,) empty casks well bunged are good substitutes, slung and fastened to the cable at equal distances, to support and keep it from the bottom.

When ground is soft and oozy, and anchors will not hold securely, but come home with little wind, it is common to cover the flukes with a broad triangular piece of plank much larger than the fluke. Sometimes the anchor is backed, or retained, by carrying out the stream, or kedge, a-head of the anchor the ship usually rides by. In this situation, the bower-anchor is confined by the stream, or kedge in the same manner as the ship is restrained by the bower-anchor.

In preparing to come to anchor, when the wind is not violent, the topsails ought always to be clued up at the mast heads ; that is, let go the sheets and haul the clue-lines and bunt-lines close up ; lower away the topsails, and take in the slack of the braces as the yards come down. In this manner, you run less danger of splitting and tearing the sails than by any other method.

In all operations hereafter treated of it should be observed that whether the wind is moderate or blows fresh, it makes this only difference, viz. The velocity of the ship's movements in the latter case, being considerably increased, the sails will require an earlier diminution to stop the head-way; and that of course less time in general is taken up in performing every operation.

To anchor in fine weather in a place where you will ride Head to Wind, being close-hauled.

Being under the three topsails, fore-topmast staysail, and mizen, stand on until you are within about two ships' length of the place where you mean to drop your anchor ; then put the helm a-lee, and haul down the fore-topmast stay-sail. As soon as the topsails shiver, clue them up briskly, before you lower; except the mizen topsail, which is to be laid to the mast, and the mizen sheet hauled flat aft, the instant the ship begins to have stern-way, by reason of the wind being a head. Then shift the helm to windward, and let go the anchor, veering away the cable, to give it time to settle in the ground, until the vessel falls off, when she is to be checked, to bring her head to the wind. When that is done, right the helm, and haul up the mizen.

Demonstration.

The ship is hove up in the wind by hauling down the fore-topmast stay-sail (§ 31) when nearly two ships' lengths from the spot where the anchor is to be dropped, because the head-way is sufficient to shoot her that distance ; and as, by this movement, the ship is generally found to stop a little to windward of the place where you mean to bring up, you wait till she begins to go a-stern a little before you let go the anchor, and the helm is at the same time shifted hard over the other way (§ 58) to moderate the ship's falling off when she is head to the wind. The topsails are clued up as soon as they begin to shiver, not only because it can at that time be done easily, since they come in of themselves as they lower ; but because, if delayed longer, the stern-way would become too rapid, since the sails would be all a-back, and would soon drive the ship to leeward of her intended anchorage. Besides, the celerity of her falling off would be such, as to cause her to drag the anchor before it had got a proper hold of the ground : and that is the reason why the cable is veered

away in order to give the anchor time to sink into the bottom by its weight. The mizen topsail is braced perpendicular to the keel, because, in that situation, the ship is impelled (§ 36) a-stern exactly in the direction of her keel. The mizen sheet is hauled flat aft, to bring the ship's head sooner to the wind ; (§ 40 ;) and, as soon as she arrives at that point, that sail shivers ; in which case it is immediately brailed up, as being no longer of use. The helm is righted, having no longer any power ; since the vessel is now brought up, and all the sails are furled, except the mizen topsail, which is flat a-back to the mast, to keep the ship steady at her anchor.

To anchor in fine weather in a place where you will ride Head to Wind, the wind being large.

If you have the wind large, whether on the beam or more aft, the operation is still the same, only hauling up a little sooner to keep to windward. because it is in your power to drift as much as you think requisite, and because the ship will be entirely stopped as soon as all her sails begin to catch a-back, and you will have done cluing them up when they begin to shake. The mizen topsail is next to be heaved to the mast, the helm put a-weather, (§ 58.) and the anchor let go, as soon as the head-way ceases : then, after giving her a sufficiency of cable, bring the ship up. If she has been going large, she will not range precisely head to wind, since her headway ceases as soon as the sails are taken a-back, and the effort of the wind acts on all the rigging of the ship to impel her both a-stern and to leeward, which is indeed augmenting the effect of the rudder, as the helm is a-weather to bring the vessel to the wind : (§ 58 :) but, as the power of the wind is very great to pay the ship's head off, it balances wholely or partly (according as the ship goes a-stern with more or less velocity) the effort of the rudder and that of the mizen : thus she drifts, and remains as it were lying-to with all her sails a-back. This is the reason why we keep a little to windward, and let go the anchor, to bring the ship's head to wind at the proper time ; which she will do the more readily as she is withheld foreward only by the cable, while the wind on her side forces her to leeward.

To anchor in fine weather in a place where you are to ride Head to the Stream and Wind, the wind being large.

If you are obliged to ride with the head to the stream, you must, when it comes from to windward, put the helm a-lee in setting the mizen, then clue up the sails ; and, when the ship's head is right in the direction of the stream. let go the anchor, provided she has quite lost her head-way ; for, else, you would get foul of the anchor-stock by running over it. This must never be neglected, unless you find yourself under the necessity to bring up in any

situation in which you may happen to be, which is almost always the case when you are taken too short to have time to stop the vessel : a reason why there is often a necessity of casting a second anchor, which generally catches the ground by assistance of the first, which has begun to diminish the velocity of the ship ; and as many of the sails are to be hauled down as you can, and as quick as possible.

To anchor in fine weather in a place where you will ride Head to the Stream, which comes from leeward, the wind being large.

When the current comes from to leeward, you must keep the ship away till her head comes to the set of the stream, and take in all the sails, to diminish as speedily as possible her headway, which always continues of itself long enough when the wind is aft or very large ; and when the ship is stopped by the effort of the water, let go the anchor, without waiting for the vessel gathering stern-way, if the current is rapid ; and, in this case, as well as all those wherein there is a sea, or blowing fresh, the ship requires a great length of cable.

To come to an anchor with the wind aft.

First, hand the main-topsail, and then lower the fore-topsail down on the cap ; and, when you are within a reasonable distance of the place where you mean to drop anchor, (which distance is to be judged of from the readiness of the ship to obey the helm, and from her velocity,) the tiller may be put either one way or the other, (§ 50.) the fore-topsail and fore-topmast staysail clued up and taken in, the mizen-topsail braced sharp up, and the mizen-sheet hauled flat aft. When the ship ranges close to the wind, she is, as it were, lying-to under the mizen and mizen-topsails, with the last-mentioned sail full or a-back, according as you may have occasion to shoot a-head or drop a-stern ; so that, if you are too much to windward of the spot where you mean to bring to, you drift till you arrive at it : if you are precisely in the proper berth, you let go the anchor in lowering down the mizen-topsail, which is to be furled as soon as the vessel is brought up ; then the ship will come head to wind by the power of the mizen, which must be brailed up as soon as it shakes.

Demonstration.

The main-topsail is taken in, and the fore-topsail lowered down, to diminish the great velocity which a ship commonly has when the wind is aft, in order to estimate the distance with greater precision, and to have her movements more under command. When you think yourself at the necessary distance the ship requires to stop close-hauled, at the place you wish to anchor, you put the

helm on board one way or the other (§ 50;) you brace sharp the mizen-topsail for the tack you haul upon, (§ 41.) and haul the mizen out to bring the ship rapidly to the wind. (§ 40.)

In the same moment, the fore-topsail is to be clued up and handed, and the fore-topmast staysail hauled down, because they oppose the movement of the ship (§ 31, 32, and 33.) as she is coming to. When you are close to the wind, the anchor is let go, if you are in the berth you wish: if still too far to windward, you can drift, keeping the mizen-topsail full; and, when you are to windward, should you find yourself too far a-head, lay the mizen-topsail a-back, to go a-stern, (§ 44.) putting at the same time the helm a weather, (§ 58.) When the vessel has drifted sufficiently, let go the anchor, and furl the mizen-topsail; because the cable might be injured, should it blow fresh: then the ship will soon range head to wind, though the mizen be still out; (§ 40;) and, when that is attained, the mizen is brailed up to prevent the ship sheering; and the helm is righted for the same reason.

In some cases you are obliged to come to an anchor with the wind aft, standing end-on, because there is not always a space necessary to deaden the ship's way. In this situation, the sails are to be taken in as soon as possible, in order to lessen the velocity of the ship. When come to your berth, let go the anchor, and veer away the cable plentifully, that the anchor may have time to take the ground; then begin to check her gently, veering still more cable as the ring-ropes or stoppers, placed on it before-hand, break away; for they should be permitted to break, in order that you may not be exposed to drag your anchor, by bringing the vessel up at once.

Scudding under a Foresail, to come to an Anchor.

The foresail must be clued up when at some distance from your berth; and, some part of the way, run under bare poles.—When near enough to sheer to the wind, you execute it by putting the helm hard a-lee; and, as soon as the ship is come-to, let go the anchor, giving her a large scope of cable, and observing to check her handsomely, in order to make her ride head to wind: as stopping her at first too short might very well endanger her cable or anchor. Should the first not bring her up, a second may be let go.

Demonstration.

As you cannot run for an anchorage under a foresail, unless before the wind, or very free, you are necessarily obliged to furl that sail at a great distance; because, in that position, the velocity of the ship will, by the violence of the wind, be but too much kept up, so as to make you run the rest of the way, which

may, perhaps, be a quarter or half a league, under bare poles, the wind being nearly aft. If you were obliged to run at that distance close hauled, you would never reach your berth, should the foresail even be set; because the ship would be laid-to, as was shown before. You put your helm over to sheer to windward when you think you are at the necessary distance, that you may have time to deaden the ship's headway: and as, when she stops coming-to, her headway ceases, you let go the anchor, and veer away a great extent of cable; because, when it blows hard, there is commonly a great swell, and the pitching motion it gives to the ship, joined to the effort of the wind on the rigging, would bring home the anchor. You are, therefore, obliged to veer away a great length of cable, to give the anchor time to settle, and to cause the cable to make a very acute angle with the ground, by which the strain is much reduced.

To anchor with a Spring, in order to present the vessel's side to a place or ship you wish to cannonade.

This is executed when you know that the wind or current will bring your head, when at anchor, towards the object you mean to attack: for, should the wind or tide bring your broadside to bear on the object you mean to cannonade, the spring would only be a precaution, to get under way more quickly in case you were obliged to retreat, or in case the wind or tide should shift.

Get a large snatch-block in the aftermost port, on the same side you wish to present to the wind or current, and on the same side with the anchor and cable with which you mean to bring up; then through the block reeve a hawser, the end of which is to be clinched to the ring of the anchor you mean to let go; the other part is brought to the capstan, with necessary ranges of the cable and hawser on deck. That done, and the ship being arrived at the berth, you are to deaden her way according to circumstances: you let go the anchor, and veer away enough cable and hawser, now a little more of the one, and then a little more of the other, according as you wish to present more head or stern; which you can do by heaving on the spring, or, what is the same, veering away more cable. Should you find it requisite to shift your position, you have only to veer out more of the hawser.

To come to an anchor in roads that are often crowded with ships, and to leave clear berths for others.

The best anchoring-berths in these places are mostly known by marks, and of course are occupied by the first ships.

In a tide or trade-wind road-stead, the next ship that comes should not anchor right a-head or a-stern of the first ship and so as to lie in the other's hawse, but should come-to on the bow and

quarter at a sufficient distance to prevent other ships from coming between, and in a slanting direction from the tide or wind. This might contribute to the safety of ships when it blows strong upon a lee-tide or in strong sea breezes, as each single ship may then veer away what cable necessary, and keep clear of the other ship's hawse a-stern ; or, in case of driving or casting, they have a better chance of keeping clear of each other.

A good anchoring-berth in a crowded road-stead is obtained by first running down through the middle of the fleet, and taking notice where a good berth is left vacant by some ship that has sailed from the middle of the fleet ; then steer out from among the ships, and turn to windward so far, as to give time to take in and furl all the sails, and run down before the wind among the ships without any sail, and let go the anchor at the intended berth.

To come to an anchor with the wind across the tide.

The ship should, if possible, be put upon the tack that stems against the tide when the anchor is let go ; and, if it be designed to continue at a single anchor, in order to keep it clear, sheer the ship and keep her to leeward of the anchor, by keeping the helm a-weather and the fore-topmast stay-sail set, with the sheet to windward.

Much benefit may result from letting go the anchor stemming against the tide, especially with a rapid tide ; for it gives an opportunity to observe at what rate the ship drives a-stern, so as to judge whether it may not be necessary to keep sail set, in order to bring the ship up to ride easy in a rapid tide, and keep her clear of shoals, &c. astern.

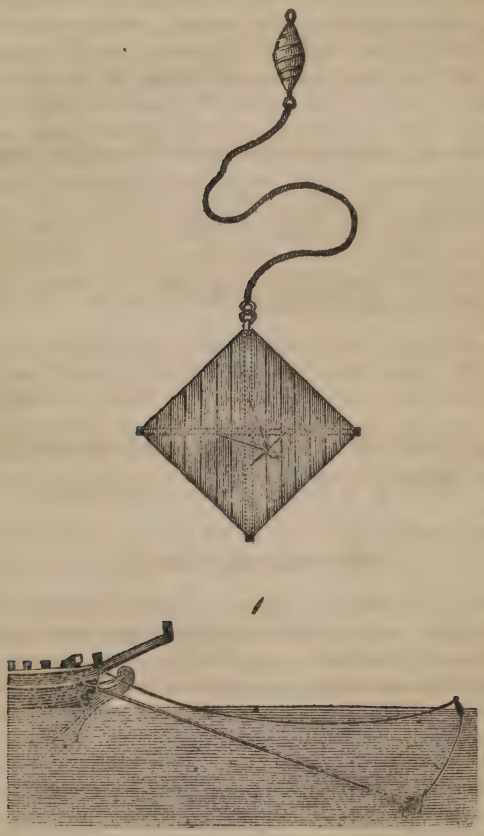
To come to an anchor when the wind is right against the tide, the ship driving with the strength of the tide against the wind.

Shoot the ship a-head of her anchor, or sheer her clear of it, upon the same tack as she is meant to shoot upon the next tide, always endeavouring to keep the ship, in swinging with the tide, on one side of the anchor, to clear it. Suppose that the ship, driving to windward, has got to an anchoring-berth, or that the tide is so far spent that she will drive no farther to windward, and must come to an anchor on the starboard tack. In letting go the anchor, the ship should be shot a-head of it, and kept a-head with the helm a-weather, the yards braced full with the larboard braces, the fore-topmast stay-sail and mizen set full, till the windward tide is done ; then she falls to leeward and rides wind-road, with the wind and anchor right a-head ; in which position she will lie clear of the anchor till the next windward tide.

To come to an anchor without tending.

If it happens that a ship is to be brought up in a place where there is not sufficient room to tend her, reduce her headway as much as possible before she comes to her anchoring-berth, so that a less scope of cable will bring her up.

Description of a Floating Anchor to ride by in a gale of wind.



This simple machine is made to dive beneath the swell of the sea, and retain the vessel where there may be no other anchorage.

It consists of two flat bars of iron, each in length half the breadth of the midship-beam of the vessel for which it is used,

and riveted together in the middle by an iron saucer-headed bolt, clenched at its point, that they may be swung parallel to each other for easy stowage. At each end of the bars is a hole for a rope, or swifter, to pass through, which must be hove tight, to extend the bars at right angles. To this swifter is marled a double or four-fold canvas cloth, made of No. 1, of the same shape, so as to be on that side of the iron bars nearest the vessel when used.

In each bar are two holes, at equal distances from the centre: and to these holes the ends of two pieces of rope are fastened: the ropes are seized together in the middle so as to form a crow-foot, having an eye in the centre, which is well served with spun-yarn, and to this is bent, when the anchor is used, a cable or hawser, by which it is made to sink and incline in the water.

In the end of one of the bars is fitted an iron ring, to which a buoy is made fast, by a rope about 12 fathoms long, to prevent the anchor from sinking to the bottom. When it is thrown overboard, the cable and a rope, made fast to the head of the buoy, are veered away sufficiently to ride the vessel.

To get it on board, haul upon the buoy-rope, which will bring it to the water's surface so as to be easily drawn to the vessel. Have the mizen-staysail ready to hoist, to keep the vessel to the wind till the anchor is hauled on board.

INSTRUCTIONS FOR THE MANAGEMENT OF SHIPS AT SINGLE ANCHOR.

Of Sheering a Ship.

IF the side of a ship at anchor is presented to the tide by any means, the water will act upon her two ways: one in the direction of her keel, the other in the direction of her beams; the last will cause her to sheer out to one side of her anchor, which was a-head before. Suppose, for example, the power which presents the ship's side to the tide to be a spring; from the anchor coming in aft on the starboard side upon heaving in the spring, the ship will sheer over to port, bringing the anchor upon the starboard-bow; the more the spring is hove in, the more the ship will go a-head, and over to port, until her side makes an angle with the tide of 45 degrees, as the farthest she can go over from her anchor: for the spring hove in after this will cause the ship to return, and be in the stream of her anchor when she is hove round a broadside to the tide. Now, if the helm is put over to starboard, it will act as the spring, by forcing the ship's stern to star-

board ; and thus, by causing the water to act upon her starboard side, the ship will be forced over to port : on the contrary, had the helm been put to port, the larboard side would be presented to the action of the water, and the ship will go over to starboard ; but the power of the rudder being according to the strength of the tide, its action lessens upon the rudder, as the ship sheers obliquely to the stream, and cannot produce so great an effect as the spring.

Riding at anchor in moderate weather.

When riding in a tideway with a fresh wind, the cable should have a short or windward service, of about 45 or 50 fathoms from the manger-board outwards, always sheered to leeward, (not to windward, as thought by some,) not with the helm hard-down constantly, but more or less so, according to the strength or weakness of the tide. Many ships have sheered their anchors home, driven on board other ships, or on sands near which they rode, before the anchor was discovered to have moved from the place where let go.

To Back a Ship.

When the wind is cross, or nearly off shore, or in the opposite direction, ships will always back by the mizen-topsail, assisted, if necessary, by the mizen-staysail. If no mizen-topsail, the main-topsail is used.

In backing, always keep a tight cable to wind the ship, that the anchor may be drawn round. If the wind is not sufficient for this purpose, the ship must be hove a-peak.

Of Bracing the Yards.

Riding with the wind afore the beam, brace the yards forward : if abaft the beam, brace them all a-back.

Of riding when in danger of Breaking the Sheer.

If the wind is so far aft that the ship will not back, she must be set a-head ; but never attempt to back, if, when the tide ceases, the ship forges a-head, and brings the buoy on the lee quarter. If the wind is far aft and blows fresh, the greatest attention is required ; as ships, riding in this situation, often break their sheer and come again to windward of their anchors ; to prevent which, the after-yards must be braced forward, and the fore-yards aft : thus she will be safe, so long as the buoy can be kept on the lee-quarter ; or, suppose the helm to port, so long as the buoy is on the larboard-quarter. With the helm thus, and the wind right aft

or nearly so, the starboard main and fore braces should be hauled aft if led aft, and forward if they lead forward.

How to manage a ship when her sheer is broken.

If the ship tends to leeward, and the buoy comes on the weather-quarter, and she breaks her sheer, brace about the main-yard quickly; if she recovers and brings the buoy on the lee or larboard quarter, let the main-yard be again braced about; but, if she comes to her sheer the other way, by bringing the buoy on her starboard-quarter, change the helm and brace the fore-yard to.

Of tending to Leeward when the ship must be set a-head.

When the ship begins to tend to leeward, and the buoy comes on the weather-quarter; first brace about the fore-yard; and, when the wind comes near the beam, set the fore-staysail, and keep it standing until it shivers; then brace all the yards sharp forward, especially if it be likely to blow hard.

It sometimes happens that, when the fore-staysail is set too soon, the ship's head will pay round off, and she will break her sheer: to prevent this, and to keep the wind broad upon the beam, it will often be necessary to set the mizen-staysail also; which should be hauled down as soon as the wind comes before the beam, otherwise the ship's head will be thrown in the wind too soon.

When the ship is likely to go to Windward with a long service out.

Riding leeward-tide with more cable than the windward-service, and expecting the ship will go to windward of her anchor, begin, as soon as the tide eases, to shorten in the cable. This work is sometimes hard, but very necessary; otherwise the anchor may be fouled by the great length of cable the ship has to draw round, or the cable would be damaged by the bows and cutwater.

When a ship rides windward-tide, the cable should be *keckled* from the short service towards the anchor, as far as will prevent its touching the cutwater.

When the ship tends to windward, and must be set a-head, hoist the fore-staysail as soon as it will stand; and, in moderate weather, the jib also; and, when the buoy comes on the lee-quarter, haul down the fore-staysail, and jib, if set; brace-to the fore-yard, and put the helm a-lee; for, till then, the helm must be kept a-weather, and all the yards full.

To manage in a Storm.

When the ship rides leeward-tide, and the wind increases, give her more cable, otherwise the anchor may start by not doing so in time, and the ship will not easily be brought up again : this is the more necessary when riding in the hawse of another ship. Previously to giving a long service, it is usual to take a weather-bit, or a turn of the cable round the windlass-end, that, in veering away, the ship may not overpower you. Grease the service, to prevent its chafing in the hawse.

If the gale increases, the topmasts should be timely struck, but the fore-yard seldom, if ever, should be lowered down, that in, case of parting, the foresail may be always ready. At these times, let there be more people on deck than the usual anchor-watch, that no accident may happen from inattention.

To tend a ship for a Weather-tide.

A ship riding at anchor upon a lee-tide, with the wind in the direction of the tide, requires, upon the tide's setting to windward, to tend clear of her anchor : for this purpose, when the weather-tide sets, and brings the wind broad upon either bow, hoist the jib and fore-staysail, and brace full the yards to shoot the ship a tight cable from her anchor : then put the helm a-lee, and wait until the buoy comes upon the lee-side : this done, brace-to the head-yard, and keep the after-yards full to assist the helm. If the buoy bears nearly a-beam, the jib and fore-stay-sail may be hauled down ; but if the wind is fresh, and shoots the ship nearly end-on with the cable, bringing the buoy upon the quarter, keep up the fore-staysail ; as, in this situation, the ship will be in danger of breaking her sheer against the helm ; and the fore-staysail will be ready to catch her before she can fall to windward of her anchor. As the weather-tide slacks, the ship will gradually fall wind-road ; then haul down the fore-staysail and right the helm : should it blow fresh, let the yards be braced forward, and give the ship sufficient cable.

To tend a ship with the wind a few points Across the Tide.

If a ship riding at anchor upon a lee-tide, with the wind two or three points upon the bow, is to be cast for a weather-tide ; when the tide is done, the ship will become wind-road, and of course must cast with her head to the weather-shore. As the lee-tide makes and brings the wind on either side, put the helm a-lee, hoist the jib and fore staysail with the sheets to windward, brace a-back the head-yards, and fill the after-yards. When the ship has sheered to windward of her anchor, haul down the jib and fore-staysail ; and, as the wind is broad upon the quarter, she will lie quiet the remainder of the tide. As the weather-tide

slacks, the ship will shoot end-on with the cable, bringing the buoy upon the weather-quarter. When the wind is a-beam, if it is thought necessary, the jib and fore-staysail should be hoisted to force the ship a tight cable from her anchor ; and hauled down when they shiver. Should it blow fresh, give the ship sufficient cable before the lee-tide makes, and point the yards to the wind.

To tend a ship with the wind Across the Tide.

The simplest way of tending a ship, is to keep each tide to leeward of her anchor. At each slack water, the ship will become wind-road ; and, as she tends, and brings the wind on either side, put the helm a-weather, and hoist the fore-staysail with the sheet to windward, to force the ship a tight cable from her anchor. When the tide is set, and the ship upon a proper sheer to leeward of her anchor, the fore-staysail may be hauled down.

General observations upon ships at Single Anchor.

If at any time the anchor-watch should wind the ship, or permit her to break her sheer, the anchor should be hove in sight immediately, or on the first opportunity.

When lying in a road-stead, the anchor should be hove in sight once a week, though there be no suspicion of its being foul, for sometimes the cable is damaged by sweeping wrecks, or lost anchors, or from rocks or stones. It is often needful to trip the anchor, to take a clearer berth, particularly when any ship brings up too near ; but, if there is the least suspicion of the ship's having come near her anchor, it should be sighted the first opportunity.

A good road-stead is much better than a bad harbour, and more safe ; therefore never leave a good road-stead for the latter, without real necessity, which can only be when you can ride no longer, and have no lee-road to fly to.

There are road-steads where an anchor will bury itself, so that the bight of the cable cannot foul it. In such places, where there is room, it is better to lie at single anchor than to moor.

If it is possible, always shoot a ship on the same side of her anchor each tide, to prevent danger from the anchor's not turning as the ship swings ; for the anchor, by not turning in the ground, endangers fouling the cable round the upper fluke or stock, which will either trip the anchor or damage the cable : and it often happens, when an anchor is tripped out of stiff ground, that it will not take hold a second time, unless the upper fluke should cant down ; for the quantity of clay sticking to the fluke prevents it setting into the ground again : so the anchor keeps tripping over the surface, and another anchor must be let go before the ship can be brought up. As a ship, by being sheered, presents one bow to the

tide, if the wind is against the tide, it must blow upon the opposite quarter.

It is not always necessary to use the yards, in tending a ship, to shoot her a tight cable from her anchor. In general, the jib, fore-staysail, and maid-topmast-staysail, will be sufficient for the purpose. Should the wind shift at any time, it will be necessary to alter the sheer of the ship accordingly.

ON MOORING.

When a ship is come to anchor in a place where she is intended to remain, prudence dictates that she should be well secured. For this purpose the putting down additional anchors is calculated, and has been denominated MOORING. The various situations of places, settings of tides, &c. occasion the necessity of the following particular directions.

When the best bower is gone, and about two cables' length is run out, the small bower is let go; and, when that has taken the ground, you heave in one cable's length upon the best bower, and veer away a cable's length of the small bower; and thus the ship is kept at an equal distance between both, the one lying to the head, and the other to the stern.

In roads where there is much tide, and freshes are expected, ships moor according to the set of the current, one anchor riding to the flood, and the best anchor and cable to the ebb.

In roads where there is little or no tide, ships moor according to the set of the most prevailing wind on the coast.

It may so happen, according to circumstances and situation, that the vessel must ride by a greater scope on one cable than the other, but still the manner of letting go the anchors is the same.

Another method of mooring is, by carrying the last anchor out in a boat to the place appointed, and there letting it go. Steadying or mooring with a kedge is usually done in this manner.

Of Mooring with one, two, three, or more anchors a-head.

This is done by letting go the number of anchors necessary, and veering away; this being no ordinary practice, but only adopted in cases of danger and peculiarity of circumstance; time, place, and situation, must be the only guide to such an operation: as one instance, suppose a ship cannot clear the shore under her lee by sailing, owing to a strong wind and high sea, the only resource is to let go all the anchors to the best advantage. For this purpose, let the cables that are bent be got clear for running.

Then furl all the square-sails as quick as possible, and shoot the ship along the shore under the staysails. When the square-sails are furled, let go the weather-most-anchor, and veer away the cable quickly ; then let go the next weathermost, and so on, till all the anchors are gone nearly in a line along the shore : thus, when the ship becomes wind-road, all the cables may be made to bear an equal strain, and are separated from each other.

To Back an Anchor.

To back an anchor is to let go a small anchor a-head of a large one, to which it is fastened, to partake of the strain, and to serve as a check upon it, should it come home.

The backing-anchor is carried out in a long-boat, to the buoy of the one already down, whose buoy-rope is cast off and bent to the cable or hawser of the backing-anchor ; that done, the boat is rowed farther a-head, till the buoy-rope and cable of the backing-anchor become tight, when it is let go, the buoy that was taken from the large one being previously bent to it.

In this situation, should the large anchor come home, the scope of cable from it to the anchor a-head, participating of the strain communicated to the innermost one, checks its progress, and ensures to the vessel a greater security.

Where there is more room to drive without danger, and it blows so hard, that the sea runs too high for boats to work, an anchor is backed by clenching, round that part of the cable next the hawse-hole, the end of a cable bent to another anchor on board. This being done, the second anchor is let go under foot ; the ship is then suffered to drive, and the cable, by the driving of the ship, becomes tight from the ring of the anchor last down to its own anchor, which, by the driving also, is now become a cable's length a-head of the former anchor.

To Moor in a Tide's way.

To bring a ship up at high water, with an intention to moor with the best bower to the ebb, let go the best bower, and bring her up with the cable stoppered, until the ebb makes strong ; then veer away two cables ; and, if possible, assist her a-stern with the mizen-topsail. If, when two cables are out and the ship in the stream of her anchor, it is thought, when moored, she will ride too near any other vessel, sheer her over from that vessel, and let go the small bower-anchor ; then ship the capstan-bars, bring-to the best bower, veer away the small bower, and heave in the best bower to the whole cable-service ; then bit and stopper the cables, leaving sufficient service within board to freshen the hawse.

To Moor with an Open Hawse to any particular quarter.

Suppose, for example, the road-stead or river, intended to moor the ship in, to lie north and south, (in which direction the anchors are to be laid,) and that her best bower is carried on the larboard side, and it is meant, when moored, the ship shall swing with an open hawse to the eastward. In this case the best bower must be the northern anchor; but, if the hawse had been required to be open *when her head was swung* to the westward, the best bower must have been the southern anchor.

How the weakest moorings may be best applied to help a ship to ride out a storm.

It may happen that the small bower cable may be too much worn, or the small moorings known to be too weak, to ride a ship out a storm, when the anchor at the best cable is in danger, or expected to come home. In this case, to make the weak moorings serve for a backing to the best anchor and cable, contrive a traveller, of sufficient sized rope to go slack round the best cable, without the hawse, and well secure it with rolling hitches seized to the weak moorings, that may be veered away, or let go, as occasion may require; if short of rope to make a proper traveller, a large stopper may be clapt on without the hawse, till the end of the small moorings is fastened round the best bower cable with a bowline-knot open enough to slide along the best cable, until it comes to the ring, which may prove such a sure backing, as to prevent its coming home.

Of keeping a Clear Hawse.

When a ship is moored, she is often thought to be in such a state of security, that the keeping a clear hawse is too often neglected.

If the hawse is clear, the ship must ever swing with her stern to the side on which the headmost cable leads.

If, to keep a clear hawse, the ship should swing with her stern to windward, it will be impracticable to get her the right way by any sail that can be set; for, as the tide slackens, she will fall wind-road; and, when the tide sets, it will take her upon the wrong side. However, if the wind continues, she cannot foul her hawse any more, as, at the next tide, the same wind will undo the cross it caused. When the wind is either a-head or a-stern, by the assistance of the mizen-topsail or jib, the ship can mostly be made to swing the right way. For example, suppose the wind a-head, or even a little upon the starboard bow, and that the ship's stern is to swing to starboard: in this case, set the mizen-topsail, with the starboard yard-arms braced forward, haul up the starboard-bowline, and hoist the jib with the sheet to windward; then, before

the lee-tide is done, put the helm to starboard, to give the ship a sheer, which will be preserved by the position of the sails. At slack-water shift the helm : thus, when the tide makes, it will act against the larboard side of the rudder and stern, and very much assist to swing the ship the right way. Again, should the wind be a-stern, and a little upon the wrong quarter, if the helm be attended to, and the mizen-topsail braced full the right way, in all probability the ship will swing as wanted.

If the helm were only properly attended, it would often save the labour of clearing the hawse.

It would be highly necessary, at all times, to have a small anchor and rope ready abaft, to run out and haul the ship round in calm weather.

Explanation of a Foul Hawse.

When a ship is moored, attention must be paid to her swinging at the turn of tide, or shift of wind, to prevent the cables overlaying each other, or getting a foul hawse, which is prejudicial, as the cables chafe each other, and as the vessel is not in that perfect state of security enjoyed by riding with an open hawse. The explanation of this turn will be better comprehended by a reference to the figures.

Fig. 1.

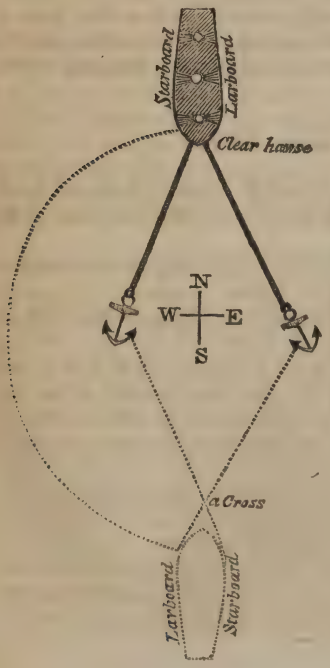
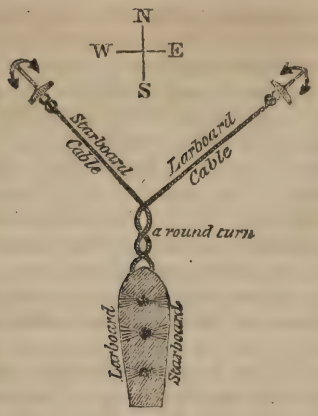


Fig. 2.

Fig. 3.



For example :—if a ship be moored east and west, and swings to the northward, the cable of the anchor, lying to the eastward, is from the hawse-hole on the larboard side, and that to the westward from the hawse-hole on the starboard side ; should the wind or tide change, so as to bring the ship to the southward of her anchors, the western anchor will be on the larboard side the vessel, and the eastern anchor on the starboard side. These two cables (the one from out of the larboard hawse-hole, and leading towards the eastward, or starboard of the ship, and that from out of the starboard hawse-hole leading to the westward, or larboard side of the ship) must, consequently, cross each other : that by which she rode, when making the movement of swinging, remaining above the other. Suppose, in the present case, the ship has swung by the eastern anchor to the western side, it will then be found in the position shown in fig. 1.

If, in a second change of situation, the ship is observed to turn round the same anchor, and to the westward, the cross will be taken out, and the cables will resume their first disposition, as in fig. 1.

If, on the contrary, the cross is not taken out, but she swings to the eastward, the cross will be doubled, and form an elbow, fig. 2 ; and, should she continue to turn westward to the southward, the cables will be again twisted, and form a round turn, as fig. 3, which should be carefully avoided.

When two cables are crossed, to take the cross out, the ship must swing to the upper cable, drawing it tight, and by that means slacking the other cable : when the cross is doubled, and becomes an elbow, the cable, which at first was the uppermost, being overlaid by the other, and making a turn, it is always on the first that the ship should make the evolution to take the turn out.

Of Clearing the Hawse.

This can only be attempted when the ship does not ride by the clearing-cable. To execute it, bend a fish-hook to the fore-bowline, hook this to the cable the ship is riding by, below the turns in the hawse, and bowse it well up out of the water: then lash the cables together at the turns. If the cable, by which the hawse is cleared, leads on the starboard side, send the larboard fore-top bowline into the hawse-hole under the cable, or under and over, according as the cable to be cleared is either below or above the other, which must be bent about three fathoms within the hawse. Then send in the starboard bowline, which should be bent well in towards the end of the cable, and stopped along the cable at every fathom, and let a hawse-rope be bent to the end of the cable. When all the bowlines are fast, unbit the cable, and haul out upon the starboard bowline: let the stops be cut, as the cable comes out of the hawse. When a long bight is out, haul upon the larboard bowline, and trice this bight up to the bowsprit. Should this one bight not sufficiently expend the cable, that its end may be taken round the other, hang it to the bowsprit, and send down the larboard bowline for a second bight. When the end of the cable is round the other, shift the hawse-rope, and haul it in again. The hawse being clear, bit the cable and unlash it.

Should it blow fresh, and the tide run to windward, it will be imprudent to trust only to the lashings, lest the cable should run out end for end. In this case, bend the hawser, with a rolling hitch, to the clearing-cable, below the turns of the hawse, and let it be howe tight, as a double security.

If it is moderate weather and an easy tide, the hawse may be readily cleared, by bowsing the headmost cable well up out of the water, and bending to it a hawser from the hawse below the turns. Then unbit the cable, veer away upon the hawser, and pass the headmost cable round the other until its end is clear; then heave in upon the hawser, take in the cable, and bit it. Should it come on to blow a gale of wind, when a ship is moored, from that quarter which will oblige her to ride equally by each cable, and the hawse is clear, it will be necessary to splice a second cable to the small bower, and to veer away equally upon both cables: but, should the hawse be foul, and it is expected that the cables will damage each other, bend a hawser below the turns in the hawse to the small bower, which slip, and let the ship swing to the best bower. When the weather moderates, heave in the end of the small bower, and the ship will be moored as before with a clear hawse.

OF GETTING UP OR WEIGHING ANCHOR.

Previously to entering upon directions for *unmooring* and *getting under sail*, it is necessary to show the various modes of *getting up an anchor*, as this operation is often requisite where it is not designed to unmoor, and as it is necessary to know how to overcome the difficulties of getting up an anchor in all cases whatever.

To Get up an Anchor, in ships which have a main and jeer capstan.

In large ships which have a main and jeer capstan, and when the strain is thought too great for the messenger alone, the viol is used thus: three or four turns are taken round the jeer-capstan with one end, so as to leave that side clear on which the cable is coming in; and pass the other end through the viol-block, which is lashed round the mainmast on the lower deck. It is then carried forward, and passed round the rollers in the manger near the hawse-holes; then brought aft, and spliced to the other end with a short splice, and the ends marled down tight. That side of the viol on which the cable is coming in is fastened to the cable by nippers; and thus the continued efforts of the capstan are conveyed to the cable, until it is hove in. The nippers are clapt on in the manger, from one to two fathoms asunder; and the viol is applied to the midships, or inside of the cable. Nippers are clapped on by taking three or four turns round the viol, four turns round the cable and viol, and then three or four turns round the cable. This method is an exceeding good one, and very suitable to quick heaving: but, when the strain is great, and the cable muddy, the nippers clapt on after this method will not nip sufficiently; and sometimes recourse is had to the following method: throw sand or ashes upon the cable, and take a long dry nipper; which middle, and pass one-half aft, racking it in and out round the cable and viol; then worm its end round the viol only. After this, pass the other half in the same manner forward, but worm its end round the cable only, and let each end of the nipper be held on. The advantages of this method are, that, as the strain of the cable lies forward and that of the viol aft, the nipper will be drawn so tight as effectually to hold the cable till something gives way: also they can never jamb, for both ends are clear for taking off. Another method, when the strain is great, is, to have nippers with an overhand knot made at one end; and with that end a round turn taken round the cable and viol, leaving three or four feet of the end; then, with the other end, take three or four

racking turns, and expend nearly the remainder with turns round the cable and viol, laying the knotted end under and over each of the last turns: the end is then held fast. The men who clap on the nippers are attended by boys, who hold the ends of them; and follow the progression of the cable as it is hove in: and, as the nippers arrive near the main-hatchway, they are taken off and carried forward, where they are again clapt on: and so in succession, until the cable is hove in sufficiently to raise the anchor above the water. It is then stoppered round all before the bits; that is, round the cable and viol. The anchor is then catted, and afterwards fished. To shift the viol for heaving in a second anchor, it must be unspliced, and the turns round the capstan reversed. When the strain is so great as to require other purchases, the top-tackles may be used thus: the double block is lashed to the mainmast or topsail-sheet bits, the treble block is lashed on the cable, and the fall brought to the capstan. If the top-tackle falls are thought insufficient, any hawser may be used that will reeve through the blocks.

To Get up an Anchor in ships which have not a jeer-capstan.

Ships without a jeer-capstan have no viol, but heave in their cables by the messenger, which has an eye spliced in each end; one of which ends is passed with three or four turns round the capstan on the upper deck, and the other end passed forwards round the rollers, at the fore part of the manger; then brought aft to the other end, and lashed thus: several turns are passed through the eyes crossing each other in the middle, and then a half-hitch is taken round the parts, and the end stopped with spun-yarn. The remainder of the operation is performed as by the viol, with this exception; the messenger is applied to the outside of the cable; and, when the nippers are insufficient, the messenger may be hitched thus: the bight of the messenger is fastened round the cable at the manger with a rolling hitch, and the bight seized round the cable before the hitch. This practice is by no means so good as the others.

When getting under way in a sea gale, the viol is better than a messenger, as the sending of the ship carries all the strain to the main capstan, and endangers the men at the bars; whereas, with a viol, the strain is taken to the viol-block, and the men at the fore-jeer capstan heave in security.

To Get up a Second anchor.

Suppose, by the former methods, that the starboard-anchor is gotten up, and that the cable of the second anchor enters the larboard hawse-hole, the operation of getting up the second anchor is the same, observing only, that the messenger must be shifted, and the turns on the capstan reversed, to change the disposition

and side: and the men, who before held on the larboard-side in the first operation, will hold on the starboard-side now: the motion of the capstan is performed the contrary way, and the cable on the larboard-side is fixed and hove in.

To Get up an anchor in Merchant-ships.

Most merchant-ships and small vessels heave up their anchors by a windlass; round which are taken three turns of the cable, and held on by hand, or by a jigger. thus: The end of the rope which has the sheave is passed round the cable, with a round turn, close to the windlass, the leading part of the rope coming over the sheave, and stretched aft, by means of the fall passing through the jigger-block; the standing part of the fall is made fast round a stantion, at the fore-part of the quarter-deck, and the leading part is bowsed upon, which jambs the turns taken round the cable; and, when the jigger arrives abreast of the hatchway, it is removed forward, and the cable is jambed by a handspeck at the windlass, until the jigger is refixed.

To Weigh an anchor with the Long-Boat.

This is done, by taking the long-boat to the buoy of the anchor, and putting the buoy-rope over the davit of the long-boat, and a tackle on the buoy-rope; by which, with the assistance of men on the fall, the anchor is weighed out of the ground. This being accomplished, the cable is hove in on board; the buoy-rope and tackle being secured in the boat, they approach the ship as the cable is hove in, and the anchor catted and stowed. Small anchors and grapnels are got up by the davit, hauling upon the cable or grapnel-rope by hand.

To Weigh an anchor by Under-Running.

This is by placing the cable over the davit-head, and under-running it, till it is nearly a-peak, when it is tripped by means of tackles as before by the buoy-rope. This method is troublesome, and is only adopted when the buoy is gone, and a ship cannot get near her anchor for want of water.

Of Cutting or Slipping the Cable to make sail.

This is a quick but very expensive method, and practised but in cases of the greatest necessity; such as when the anchor is hooked to rocks, and cannot be purchased; in bad weather; when at anchor on a lee-shore and in danger of being embayed; or when compelled to fly from or pursue an enemy. The cable is cut by an axe at the hawse-holes or at the bits. Slipping the cable, if time will permit, (which prevents losing the anchor and

cable, and is more prudent than cutting,) is by letting the cable run out end for end. Observing however before it is either cut or slipped to pass a spare buoy-rope in the hawse-hole, and fasten it near the end with a rolling hitch ; worm the end in the cunt-line and stop it, that it may be easily regained.

To Sweep an Anchor.

To sweep an anchor is seeking at the bottom for one lost, by means of a rope called a sweep. This rope has its two ends made fast to two boats abreast of each other, at a small distance asunder. On the bight of the sweep is fixed a weight of shot, ballast, &c. to keep it at the bottom. The two boats row on toward the place where the anchor is supposed to be, and consequently draw along the sweep ; which, taking the bottom, hooks or entangles itself with the object of their search. The boats then row across each other twice, so as to take a round turn with the sweep, which being a hawser, both parts are brought into the hawse-hole and to the capstan, (or if small, to the long-boat,) and hove in upon as before.

TO UNMOOR.

Should the ship to be unmoored have her best bower to the ebb, let her be unmoored upon the ebb-tide : but, if there were a necessity to unmoor upon the flood, the stream-cable must be spliced to the small bower, supposing the small bower has but one cable. To unmoor upon the ebb, when it has made strong, veer away the best bower, bring-to and heave in the small bower, and keep veering away the best, till the small bower is up-and-down ; then stopper the best bower.

The small bower being up, cat the anchor, shift the messenger, bring-to the best bower, and heave in to the whole or half-cable service, as may be thought necessary ; then bit the cable, and fish the small bower anchor.

Should a ship be under the necessity of unmooring upon a windward-tide with a strong wind, it will be very difficult and dangerous to take up the sternmost anchor. In this case, if there be no ships in the way, the headmost anchor may be the first taken up with safety, and the sternmost cable be hove in towards slack water.

ON TACKING.

To Tack a ship in getting to Windward as much as possible.

To execute this with propriety, care must be taken that the ship does not yaw, that she is not too near or too far from the wind; because both situations are equally prejudicial.

When this medium is obtained, haul the mizen out, while you put at the same time the helm a-lee, and brace the bowline quite to leeward, that the mizen may be as much as possible exposed to the wind. When the ship is come to the wind, so as to cause the square-sails to shiver, let go the jib and all the staysail-sheets before the main-mast: at the moment when all the sails catch a-back, and particularly the mizen-topsail, let it be braced sharp about the other way; hauling up at the same time the weather-clue of the main-sail; and, when the wind is right a-head, or even a little before, haul the main-sail, and trim sharp for the other tack as fast as possible. The jib and staysail-sheets are also to be shifted over at the same time, in righting the helm, whether the ship has lost her way, or even still advances a-head. Then, as soon as she has passed the direction of the wind about 45°, in continuing her evolution, shift the fore-mast's sails, which are to be trimmed with the same celerity as in putting the helm a-lee, if you fear the ship (which must still go a-stern if the operation be slowly executed) will not fall off sufficiently: for, if the sails are braced about briskly, she will never have sternway; on the contrary she will get a great deal to windward.

Demonstration.

If the ship be too near the wind, when the helm is put a-lee, she will most probably miss stays; since, not having sufficient way through the water, the rudder will not have sufficient power to cause the ship to double the critical point where all the sails shiver. The power of the rudder to turn the ship is in proportion to the force with which the water strikes it. (§ 58.) Hence it follows, that, if the ship has not sufficient velocity, the rudder will not have force enough to cause her to double the point, where all that can augment or keep up the rapidity of sailing (and of consequence the power of the helm) will cease, the sails being all shivering. The ship must then necessarily fall off, since the helm is a-lee, and none of her sails tend to shoot her a-head. On the contrary, her mizen being out, and braced quite to leeward, forces the stern of the ship athwart; (§ 40.) while, by the wind which strikes her sails, rigging, and hull, she is but too ready to

drive a-stern, as a ship always finds great difficulty to divide the fluid laterally. Thus it is clear, that, every thing being disposed for driving the ship the sternway, she must infallibly both go a-stern and to leeward. (§ 58.) This is confirmed by experience: for, whenever a ship misses stays, she visibly falls abaft.

If, previous to tacking, a ship is kept too much away, she will be longer in ranging to the wind; which must consequently be disadvantageous to the evolution. We should not have mentioned this custom, did not many seamen, through mere habit, put it in practice, and thereby fail in this operation, which would however have succeeded, had they not the habit of letting go the fore, jib, and staysail, sheets. When these have been kept fast, the edging away can only prolong the time of the evolution; but if the fore, jib, and staysail, sheets be let go, as a great many do at every turn, and as in some particular cases it is really found necessary, care must be taken not to suffer the ship to fall off too much: because the velocity of the ship not being sufficiently kept up (§ 46) till the ship comes to the wind, it follows that she has lost a good deal of it, before she arrives at the critical part of the evolution, where all the sails shake. So that, when the ship is at that point, the velocity is so much diminished, that the rudder has not power to make her double it: on the other hand, the fore-part of the ship is no longer carried to the wind with the same force, since the vessel no longer shocks the fluid (§ 47.) with her first velocity.

The mizen is hauled out to help the rudder: because these two forces act together in impelling the after part of the ship to leeward, (§ 40 and 50.) When the helm is a-lee, the ship, of course, comes head to wind: and continues that circular motion, first by the effect of the rudder, till the headway ceases, and then by that of the mizen, till the other sails take the wind from it. Therefore, when the mizen is becalmed by the other sails, the evolution is sure, as this could not happen if those sails were not taken aback.

You must wait till the square-sails begin to shiver, before letting go the jib and all the staysail-sheets before the mainmast; because, till that moment, these sails concur to maintain an equilibrium with the others, and keep up the ship's velocity; since it is the disposition of the different sails set on the different parts of the ship, which gives her more or less way through the water, (§ 46.) These, however, being now the only sails which tend to make the ship fall off, (§ 31.) since they are the only sails full, the other being shivering, it is absolutely necessary at this moment to suppress that effect, since it is contrary to the movement of coming-to; the action of the mizen is, however, to be preserved as long as possible, in order to help the rudder, which, in keeping up the movement of rotation of the ship, will soon make her clear the critical point of the evolution.

Experience teaches that the motion of the ship, in coming to the wind, at the moment the jib and staysail sheets are let go, is very rapid, provided the other sails shiver; because the velocity

of the ship, at that motion, is as great as when all the sails were exposed to the impulsion of the wind. Consequently the effort of the rudder is likewise very powerful, (§ 50.) since the rapidity of sailing has not diminished.

The mizen sail is to be braced up so far as to join the main-shrouds to windward; because, in that situation, it is exposed as much as it possibly can be to the wind, and receives, consequently, a stronger and longer impulsion; and again, because it is trimmed as it will remain even after the evolution has been performed.

The mizen-topsail should be braced about as soon as it is taken a-back, because it will then impel the stern to leeward, jointly with the mizen, (§ 44.) and, by this new disposition, accelerate the evolution: whereas, if it were continued in its first situation, it would retard the circular motion of the ship, by impelling the after-part to windward, (§ 45.) It will also, in this situation, become very useful, in moderating the stern and leeway of the ship.

At the same time, the weather clue and sheets of the mainsail are hauled up, in order that all may be ready to brace round for the other tack.

The main sails are to be hauled about and filled when the wind is right a-head; because. 1st, at this time the sails on that mast are becalmed by those of the foremast: 2dly, should they be left longer in this situation, they would counteract the head sails, (§ 37, 38, 44, and 45.) which are braced up for the same tack, and in the same manner; and finally, because, were it not for this, the sine of incidence of the wind on them would be continually increasing as the ship was falling off, which would more and more retard her bearing away.

It is, notwithstanding, not untrue that the evolution would be more rapid, if the sails on the mainmast were filled as soon as they are taken a-back: because (§ 44.) they would impel the after-part of the ship to leeward. But this effect of the after sails ought not to be attended, except when the ship has lost her velocity, and the rudder its power. Whence it must be concluded, that the ship will always fall off with great celerity as soon as the mainsail is hauled.

The jib and staysail sheets are also shifted at this time, if they have not been lowered before; because, if sooner, they would take the wind in again, which must not be done before the ship has fallen off sufficiently to clear the direction of the wind.

The helm is to be righted if the ship has lost her way; because, if it were continued a-lee, as in the first instant, and the ship should get sternway, the rudder (§ 58.) would oppose the evolution, which must now be finished with sufficient rapidity by the sole effect of the head sails, as these are now fully exposed to the power of the wind. Great care must be taken not to slack

the bowlines, as is often done by people who act more from custom than reflection.

The head sails are to be braced about and filled, when the ship has passed over the direction of the wind by 45 degrees, or thereabout; because, if they were left longer a-back, the motion of the ship's falling off would become too rapid and too great. If they are braced about briskly at the time before mentioned, they may be made to shiver; which, by diminishing their effect, will moderate the great velocity of falling off which the ship has acquired, (§ 37.)

The helm ought to be put a-lee (§ 58.) if the ship goes a-stern, to aid her falling off, which is now carried on only by the jib and staysails before the centre of gravity. Thus the ship falls off moderately, in yielding to the wind by 12° or 20° only, more large than if close-hauled: because the after sails, being trimmed sharp, soon bring the ship to the wind, and give her headway, (§ 41.) Let it not be forgotten, that the helm ought not to be put a-lee in hauling off all, unless you judge the ship not sufficiently inclined to fall off, which, however, seldom happens when she is come to this point.

The demonstration of this evolution comprehends the whole play of the sails and the rudder; so that all other demonstrations might be considered as so many corollaries deduced from it.

To Tack a ship without endeavouring to get to Windward.

There are sometimes circumstances when it is found necessary to tack, without caring much whether or not the ship loses to windward. For example: when a ship is found suddenly close to the land, in the night, or in foggy weather, near a danger, or some vessel, which must instantly be avoided by staying the ship, because you find yourself to windward, and too near the object from which you wish to recede: in this case, when it is necessary to deaden the ship's way, and tack at the same time, you must suddenly put the helm hard a-lee; and, in the same instant, let go the jib, fore and staysail sheets, without touching the bowlines; and great care must be taken that the effect of the mizen is preserved as much as possible. When the sails begin to shiver, the mizen is to be hauled quite in the lee braces; then, if the ship takes well the wind a-head, the remainder of the operation must be executed as directed in the preceding case; but, if you should miss stays, you must proceed according to the second method of veering, called *boxhauling*.

Demonstration.

It is easily conceived, that, in letting go the fore, the jib and staysail sheets, the ship's headway will be diminished, (§ 46.)

while, at the same time, almost all the forces forward are taken away, which might hinder her coming to the wind, (§ 31.) : therefore, the ship must come to it rapidly, by the effect of her after sails, (§ 41.) which are trimmed sharp, and by the power of the helm, (§ 50.) till all the sails shake. It is also easy to conceive, that when the mizen is hauled in the lee braces, it has a greater power to impel the afterpart of the ship to leeward, and the sails consequently to take a-back. So that the ship's headway will the sooner be stopped ; and, the fore-sheet being gone, the sail to windward makes a large cavity between the mast and shrouds, which very much contributes to send the ship a-stern. Attention ought, therefore, to be paid to catch the instant, when the headway ceases, to shift the helm and aid the ship in her evolution ; as we hinted already. The reason this method is not always practised is, because the ship would lose a deal of ground in driving to leeward. It ought, therefore, never to be used but through necessity, and when the vessel has good way through the water; for, if she has not, she will generally miss stays.

To Tack a ship in a dangerous Rough Sea, when her staying is doubtful.

Let every thing be got clear and ready ; the hands at their proper stations, the sails trimmed fair, and the ship steered just full, and close by the wind. Take the advantage of the smoothest time, when the ship has the most headway. The other necessary precautions are, to haul down the jib, if set, and not to put the helm a-lee all at once, but to luff the ship up by degrees, to shake the sails. When they shake, give these orders :—The helm hard a-lee ; let go the lee sheets forward, but not the lee braces and foretop-bowline, as that usual practice backs the head sails too soon, and stops the ship's headway, which ought to continue to give power to the helm, till the wind is brought a-head, or the ship will not stay. Raise tacks and sheets and mainsail haul, when the wind is a-point on the weather-bow ; this swings the yards round sharp, that the main-tack may be got close down, while the head sails becalm the fore-leech of the main and maintop-sails ; while the wind, blowing aslant on the after-leech of these sails, acts jointly with the rudder to turn the ship's stern, so as to bring her about the right way. When she has fallen off five or six points, let go and haul.

When a ship comes about, she is sure to have sternway by the time the head sails are hauled : therefore, the helm should not then be shifted a-lee, but should be kept hard a-weather, till her sternway ceases. The water, acting upon the weather-side of the rudder, prevents the ship falling round off from the wind, which the helm, when hard a-lee, occasions, while the sternway continues. Notice should be made by the compass, that the ship con-

tinues coming about till the wind is on the other bow ; for, if she stops with the wind a-head, and her headway is perceived to be done, the helm should be directly shifted to the other side: so that, by the sternway, the water may act upon the rudder and bring her about, and then the helm should not be kept a-lee but directly shifted and kept hard a-weather till her sternway ceases. For the reason just giving, the head sails may be hauled as soon as possible ; for, the ship will be sure to fall off the faster and farther in proportion to her sternway ; so that the weather-braces should be tended, to prevent the head yards flying fore and aft, as they will do when it blows fresh ; and to keep the head sails shivering, that the fore-tack may be got close down easily, and the ship stopt the sooner from falling off. Shift the helm a-lee when the sternway ceases, and the head sails may be trimmed sharp as the ship is perceived to come-to.

On turning to Windward in very Narrow Channels.

At weighing, if the wind is partly across the tide, it will cast the ship with her head towards the weather-shore, which she may be kept clear of, by driving with the sails a-back till the anchor is up and stowed; and, as the tack towards the weather-shore is the shortest, it is prudent to back as near the lee-side as possible, in order to make the first board the longer ; to get the three topsails, jib, staysail, and mizen, properly set ; and to get all ready in time for tacking. Make as bold as possible with the weather-shore, because on that side a ship is always surest in coming about ; and, in case of missing stays, a ship may be backed off from the weather-shore, till she has room to fill and set the sails, and get sufficient headway to try her in stays again without danger. But, when the ship is got about, and standing towards the lee-shore, it may be necessary to put her in stays in good time ; because she does not so certainly stay when going slanting with the tide as when going across it.

By staying her thus in good time, if she even miss stays, there may be room enough to fill and try her the second time, or to use such means as may prevent her going on shore.

But, when the wind is right against the tide, which begins to make to windward, be cautious not to weigh the anchor till the ship swings end-on to the tide, and brings the wind so far aft, that she may be steered right against the tide till the anchor is up and stowed, and the sails, with which the ship is to work, are all ready.

Haul the wind and get ready for tacking, when you are close over to one side, to gain the whole breadth of the channel for getting under way. For this purpose, let the first trip be made as short as possible, till it is found how the ship works upon both tacks ; and then make longer or shorter boards accordingly, but

take care not to stand into an eddy tide on either side, which has often occasioned ships to miss stays and go on shore. If a ship will not stay, she must be veered, box-hauled, or club-hauled.

OF VEERING.

To Veer a ship, without losing the Wind out of her Sails.

To execute this evolution, both the main-sail and mizen must be hauled up, the helm put a-weather, and the mizen top-sail a shivering, which will be kept so till the wind be right aft, suppressing for that purpose the effect of all the staysails abaft the centre of gravity. As the ship falls off, (which she will do very rapidly,) round-in the weather-braces of the sails on the fore and main-mast, keeping them exactly trimmed to the direction of the wind, and remembering also that the bowlines are not to be started till the ship begins to veer. As she falls off, ease away the fore-sheet, raise the fore-tack, and get aft the weather-sheet, as the lee one is eased off; so that, when the ship is right before the wind, the yards will be exactly square. Then shift over the jib and staysail sheets; and, the ship continuing her evolution, haul on board the fore and main tacks, and trim all sharp fore and aft, remembering to haul aft the mizen and mizen-staysail sheets as soon as they will take the right way, or when the ship's stern has a little passed the direction of the wind. When the wind is on the beam, right the helm to moderate the great velocity with which the ship comes-to; the sails being trimmed, stand on by the wind.

Demonstration.

The main-sail and mizen are hauled up, and the mizen-topsail shivered, in order to facilitate the evolution (§ 40 and 41). The main-sail, however, might be excepted from this rule, by letting go the main-sheet (§ 49), and working it like the main-topsail. The helm is put a-weather, because, in that situation, the rudder (§ 50) causes the ship to fall off, or yield to the impulse of the wind, by impelling the after-part of the ship to windward with so much the more velocity, as the power of the head-sails exceeds that of those abaft (§ 47); and as the rapidity of sailing increases, the effect of the helm augments in the same proportion. The sails are trimmed to the direction of the wind, as the ship veers, to increase her head-way, and of course the power of the rudder (§ 58); which, in great evolutions, is the chief mover and principal agent of the movement of the ship. So that, its effects being

augmented, the ship's circular motion is of course accelerated in the same ratio ; and, if the wind be well followed, every sail will be found properly trimmed when the evolution is finished. Since the sails must be kept in a proper situation with respect to the wind, except the mizen topsail, (which, from its situation on the after-extremity of the ship, would retard her veering, the fore-sheet must be eased off to leeward, and gathered aft to windward, but in proportion as the ship falls off. It is also evident, for the same reason, that the bowlines must not be started till the ship begins to veer. When the ship is right aft, the jib and stay-sail sheets, which are then becalmed by the square-sails, are shifted ; because, the ship coming to the wind, they are ready trimmed, and highly serviceable in keeping her under command.

The mizen is hauled out as soon as the ship's stern has passed the direction of the wind, to accelerate her coming to (§ 40) ; and the sails fore and aft ought to be trimmed sharp at the same moment, in order to keep to the wind without losing any time. For the above-mentioned reasons, the main tack is got on board, and the sheet aft, when the wind is on the quarter.

To Veer a ship that has lost her Foremast.

Run out the end of a cable or hawser over the lee-quarter, and buoy it up from the ground with empty casks, &c. in case of coming into shoal-water with little wind. This will assist the helm with such power as to make the ship veer and steer at pleasure.

A spare yard or boom, rigged out abaft the mizen-shrouds, may guy the end of the cable or hawser more or less on either quarter, according as the ship may have occasion to sail. It may be easily shifted from side to side, and guyed out to leeward in proportion to the ship's griping, to answer sailing upon both tacks ; and, when sailing before the wind, it may be secured over the middle of the stern, which will prevent the ship's broaching-to against the helm either way.

This would likewise much assist deep-laden bad-steering ships, and prevent their broaching-to ; to which they are liable in spite of the best helmsmen, often occasioning them to lie-to, even with a fair wind. With a little contrivance, by blocks lashed to the rails on the quarters, to lead the guys fair to the steering wheel-barrel, it may be made to steer a ship that has lost her rudder. The invention of Capt. Edward Pakenham is, however, far preferable for this purpose.

To Veer when Lying-to under a Main-sail.

Advantage must be taken of the ship's falling off to put the helm a-weather, and ease away the main-sheet roundly ; and, when the ship has fallen off about 30°, let go the main bowline, and round-in the weather-brace, taking care to keep the sail full. When the

ship is before the wind, get on board the main tack, and right the helm, to moderate her coming-to.

If, in the beginning, the ship is found difficult to veer, the fore staysail may be hoisted, and the sheets hauled well aft ; but it is to be hauled down as soon as the ship is before the wind.

Demonstration.

Opportunity must be taken of the ship's falling off, because that motion of the ship gives her way, and makes her of course better disposed to gather way. For that reason, also, the helm is then put a-weather, (§ 50, 58,) and the main-sheet eased off roundly. (§ 49,) that only that part of the sail which is before the centre of gravity of the ship may be left to act. The main bowline is kept fast till the ship has fallen off 30° at least, and then let go directly, because the wind is then more easily kept in the sail, the velocity of the ship increased, and consequently the power of the helm (§ 58) and the movement of the rotation is also accelerated. (§ 16, 17, 18.) By hauling in the weather-brace, you follow the wind with the sail ; and, when the wind is right aft, that sail will be found square. To trim it, you have but to ease off the brace, and bring the tack on the same board as you take the wind ; an operation for which you have full time sufficient, as by righting the helm, you moderate the velocity with which the ship flies to the wind, since, by that action, the effect of the rudder is totally suppressed.

A second method.

Make fast a four-inch rope to the slings of the main-yard ; and, when the ship comes-to, so as to shiver the main-sail, bring it down before the sail to the topsail-sheet bitts, and let it be hauled tight and belayed. Then, as soon as she falls off, put the helm a-weather, and let go the main-sheet. By these means, the lee-part of the sail no longer has any power to keep the ship to the wind, and the weather-part acting before the centre of gravity will cause her to veer faster than by the first method ; though, in general, the first method will answer the purpose.

To veer under Bare Poles.

The fore-staysail must, if circumstances will allow it, be hoisted. (§ 31.) But, if that cannot be done, the head-yards are to be braced up as sharp as possible, and those abaft pointed to the wind. Then, if the ship veers, she will steer under the masts and ropes only. A number of seamen, sent up and placed close to each other in the weather fore-shrouds, will be found also of very great service.

To Boxhaul a ship, or the second method of Veering.

In this evolution, the most rapid execution is necessary. Briskly, and at the same instant, haul up both the main-sail and the mizen ; shiver the main and mizen topsails : put the helm hard a-lee ; raise the fore-tack ; let go the head bowlines, and brace about the head-yards sharp the other way ; and let the jib and staysail-sheets go in the same instant. When the ship has fallen off 90°, brace the after-yards square, in order to give the ship a little way, and to help her (with the rudder, the situation of which must be changed) to double the point where all the sails shiver ; and when the wind is aft, you will proceed as in the method of "*Veering without losing the wind out of the sails.*"

If the circular motion of the ship, after she has fallen off 90°, continues pretty rapid, the filling of the after-sails, to give the ship headway, may be dispensed with ; because she continues to turn by the effect of her helm, which must not be shifted, (§ 58.) since the vessel still continues her sternway. Therefore, after having veered a few degrees more, the wind will fill all the sails, and the ship consequently will have headway. (§ 35 and 43.) Then change the situation of the rudder, (§ 50.) to bring her before the wind.

In a case of absolute danger, when it might be necessary to go a-stern and fall off more rapidly, put the helm a-lee, brace all the sails a-back, observing not to brace the after-sails more than square, that they may not counteract the head-sails, which are braced sharp a-back to pay the ships's head off ; because the effect of the after-sails, in this situation, is to impel the ship abaft in the direction of her keel, (§ 36 ;) which, with those forward, contribute to give her fresh sternway, in order to cause the ship to veer (§ 58.) with great celerity. The jib and fore-topmast staysail-sheets being hauled over to windward, will assist the ship in falling-off and going a-stern. (§ 31.)

When a ship is taken a-back, by bad steerage or a shift of wind, she may sometimes be brought on the same tack again, by instantly bracing sharp round the head-sails, and keeping fast the jib and staysail sheets. One must recollect, also, the after-sails are not to be touched (§ 45.) till the ship has sufficiently fallen off ; and, when that shall be the case, trim the sails and stand on as before. The rudder is to be used, as occasion may require, according to § 50 and 58, whether the ship has head or stern way.

Demonstration.

This operation should be performed with the greatest alacrity, because it is only practised in critical situations ; such as finding the ship unexpectedly too near the land, or because the ship misses stays.

The reasons for hauling up the main and the mizen sails, and shivering the mizen-topsail, having been given before, we have only to add, that the reason why the main-topsail is shivered is, that, if it were kept full, it would bring the ship to the wind, (§ 41.) by shooting her a-head, so that she would almost be laid-to. If this sail were braced a-back, more than perfectly square or perpendicular to the keel, it would still keep the ship to the wind, since it would be braced the same way with the head-sails. Therefore, it would impel the after-part of the ship to leeward, (§ 44.) and act, consequently, against the power of the head-sails, which ought to cause the ship to veer rapidly, because they receive the wind on their anterior surfaces (§ 37 and 38) with a very great sine of incidence. It is therefore absolutely necessary to keep the after-sails shivering till the ship has fallen off 90°, or thereabout; because, then, all the sails are trimmed and shivering in the same direction, since the head-sails were suddenly braced sharp a-back, in the beginning, to promote the ship's veering; and the after-sails were also changed at the same time, by bracing them by little and little to the wind, to keep them shivering, as the ship falls off. If the sails are well worked, they will all be found shivering at the same time; and then they no longer act on the ship, which will not double this point by the sole effect of the helm, for the helm was put hard a-lee in the beginning, to heave up in the wind with all possible expedition; but the ship, soon after getting sternway, falls off rapidly, both by the effects of her sails, and by that of her rudder, which is well disposed for this movement, (§ 58.) but has not always sufficient force to cause the ship to double the point where all her sails shiver; because the wind, being then on her quarter, acts on the whole machine to send her a-head; so that, if one ceased working here for a moment, the ship would be motionless for a time, having lost her sternway. To put her again in action, and to prevent her from driving more than is necessary to leeward, fill the after-sails, as mentioned above, to give her headway, in order that, by shifting the helm, (§ 50.) the wind may be quickly brought aft.

The jib and staysail sheets are let go, because they tend to draw the ship a-head. (§ 31.)

Boxhauling is deemed the surest and readiest way to get a ship under command of the helm and sails, with the least loss of ground to leeward, when a ship refuses stays. The masters of sloop-rigged vessels, turning to windward in narrow channels, when they want but little to weather a certain point, run up in the wind till the headway ceases, then they fill again upon the same tack: this they call making a *half-board*. Thus a ship, in boxhauling, may be said to make two half-boards, first running with her head, then with her stern, up in the wind; by which two motions a ship rather gains to windward.

To Clubhaul a ship.

Clubhauling is practised when it is expected that a ship will refuse stays upon a lee-shore. Place the hands to their stations for putting the ship about, and some by the lee-anchor; then put the helm down, and if the ship make a stand before she brings the wind a-head, let go the anchor and haul the main-sail. When the wind is a-head, cut the cable, and the ship will cast the way required. The after-sails being full, let go and haul.

Another method.

Bend a hawser to the kedge-anchor on the lee-bow, and bring the end into one of the after-ports, or over the taffarel. Let go the anchor, brace up all sharp the contrary-way, put the helm a-lee, and haul in briskly on the hawser. As soon as she gets head-way, cut or slip the hawser, and carry a press of sail.

OF LYING-TO, &c.

Of Lying-to in Fair Weather.

Lying-to is the art of disposing the sails in such a manner, that, counteracting each other, they render the ship as it were, for a time, immoveable.

This is seldom practised but under the three topsails; yet it is indifferent whether the fore or main-topsails be braced a-back or kept full; because, as these two sails have surfaces nearly equal, they have nearly the same power either to stop the ship's way, or to cause her to run a-head. When these two sails act together, or one against the other, one always tends to pay the ship's head off, and the other to keep her to the wind. (§ 32, 37, 41, and 44.) But there are other considerations to be attended to, when necessity requires this operation to be practised.

To Lie-to to Windward of a ship, so as not to Drift near her.

The main-topsail must be braced sharp a-back, keeping the fore and mizen topsails full; because the wind acts with a very small sine of incidence on a sail when full, in comparison to what it does when braced sharp a-back: so that the fore-topsail, being full, draws the ship a-head, and the effect of falling off is opposed by the main and mizen topsails. She will of course not fall off

much; nor will her lee-way be very considerable; for the ship is well kept to the wind, by the disposition given to her sails.

To Lie-to Under the Lee of another ship.

The fore-topsail ought to be braced sharp a-back, the main and mizen topsails kept full, because these two last-mentioned sails tend to give the ship headway, and keep her to the wind: they may be assisted by the mizen, which will oppose the falling off occasioned by the fore-topsail. Thus, should the ship to windward fall off violently, or drift too much, you are more ready to veer short round, and avoid being boarded; because the fore-topsail being braced sharp a-back, the impulse of the wind on it is much greater than if it were full; and, it is well disposed to veer suddenly, as soon as the power of the other sails is suppressed.

To Bring-to with the Fore or Main Topsails a-back to the mast or filled.

Either the fore or main topsail must be braced sharp a-back, and the lee-bowline hauled up a little: the other two topsails trimmed sharp; with the mizen hauled out, and the helm a-lee.

If you bring-to with the fore-topsail to the mast, the head-yards may be only laid square. Then the wind will act obliquely on the sail, and the ship will fall off but little, because its effect is in the direction of the keel from forward aft, and the sails abaft keep the ship to. The main-topsail may be worked in the same manner, if you wish not to expose yourself much to the wind.

Demonstration.

It has already been demonstrated that, if the fore or main topsail be braced sharp a-back, while the other remains full by the wind, the ship stands as if it were immoveable, for their actions are absolutely contrary with respect to the centre of gravity, (§ 18.) and very nearly equal; therefore, in this situation, the ship can but drive to leeward at the rate of about half a league an hour.

To Bring-to with the Three Topsails a-back.

The jib and staysails being hauled down, brace sharp round at once all the sails you wish to lie a-back in hauling up the lee-bowlines, the better to expose the sails to the action of the wind: haul out the mizen, and put the helm hard a-weather.

Demonstration.

The jib and all the staysails are hauled down, because they are before the centre of gravity (§ 31;) and the head-sails, being

braced sharp a-back, have force enough (§ 37.) to balance the effect of those abaft (§ 44;) which, being braced in the same manner, receive the wind with the same sine of incidence as those forward. But, as in that situation the head-sails, having more power to cause the ship to fall off (§ 12.) than those abaft, being a little becalmed by those forward, have to bring her to the wind, the mizen is hauled out (§ 40.) and the helm is put a-weather (§ 58.) because the ship goes a-stern with all the topsails to the mast. In this situation, then, the sails, assisted by the rudder, act the one against the other, and balance reciprocally their effects of springing the luff and falling off; and, though the ship goes a-stern and drifts a great deal, she is laid-to; because, in that situation, she yields but with great difficulty to the impulse of her sails, on account of the resistance of the water (§ 5.) opposed to the very great surface of her bottom under the lee.

If there were occasion to keep the mizen topsail full, it might be done with advantage; because the effect of its acting against the other sails is so inconsiderable, that it cannot admit of a comparison, as its surface is hardly half that of the main topsail.

If it be desired to go a-stern without falling off, the head-sails are to be laid square only.

To Fill, when lying-to with the Fore-topsail to the Mast.

Brail up the mizen, hoist the jib and fore-topmast staysail, shiver the main and mizen topsails, and when the ship has fallen off 20° or 30°, fill the fore-topsail, which was a-back before, and stand on.

Demonstration.

The mizen is hauled up, that its effect of keeping the ship to the wind may cease (§ 40). The jib and fore-topmast staysails are hoisted, to help the ship in falling off (§ 31). The main and mizen topsails are shivered, because their effects are contrary (§ 41 and 44) to the movement expected from the ship. Every thing, therefore, which causes her keeping to the wind, ceasing to act, and all that promotes her falling off now operating, it follows that she must fall off with a rapidity so much the greater, as the helm is still a-lee (§ 58). The ship goes a-stern, since her head-sails are braced a-back, and her after-sails so disposed and shivering, that, when she has fallen off sufficiently, the head-sails fill, and you stand on directly.

To Fill, when lying-to with the Main-topsail to the Mast.

Brace sharp and briskly the fore-topsail a-back; shiver the main and mizen topsails; hoist the jib and fore-topmast staysails, and

brail up the mizen, all at the same time: and, when the ship has fallen off 20° or 30°, fill the fore-topsail and stand on.

If you are obliged to keep the wind on the same tack as that on which you are lying-to, you have only to right the helm, fill the topsail which is a-back, and trim it sharp to continue your course.

Demonstration.

The fore-topsail is braced sharp a-back, in order to cause the vessel to fall off more readily, as then it receives a very strong impulse from the wind (§ 37). The rest of the demonstration will be found in the preceding.

A second method.

Trim the topsail which was to the mast, in order to give the ship way through the water, and be able to tack, or run large, according as may be found necessary. But this method is very tedious, unless you mean to heave in stays; in which case it will be most expeditious.

A third method.

Shiver the main and mizen-topsail, keeping the fore-topsail full, righting the helm, and running up the jib and fore-topmast staysail at the same time. As soon as the ship has fallen off enough to get headway, fill the after-sails, and keep the ship in the direction you mean to follow. It is easily seen that this method, though the most common, is not the most expeditious, when you have to veer considerably.

To Fill, when lying-to with all the Sails to the Mast.

Brail up the mizen, lay the after-yards square, and shift the helm a-lee. When the ship has fallen off sufficiently to fill the after-sails, those forward are then to be braced about and trimmed full also, in order to stand on.

Demonstration.

The mizen is brailed up, because its effect is to keep the ship to the wind (§ 40). The after-yards are laid square, because then they give the ship sternway, (§ 36) which causes her to fall off, since they increase her velocity in the last-mentioned direction, the helm being a-lee so as to turn the stern to windward (§ 58). The head-sails are braced about and filled at the same time as the after-sails are, that the ship may not be as it were laid-to, and that she may get head-way to continue her course.

Of Lying-to in a Gale of wind.

To lie-to when it blows hard, keep as close to the wind as possible under some one sail well trimmed, with the helm lashed a-lee as much as may be requisite for the ship ; and, as ships commonly bring-to from the stress of contrary winds, care should be taken to heave-to under such sail as will least strain the ship ; because there are some ships which lie-to better under the fore-sail than the main-sail, others are more easy under the main-sail, some under a mizen, and many vessels lie-to best under a main-staysail.

Lying-to under a Foresail.

This is advantageous for veering (§ 32.) when you are well to windward ; but it augments the lee-way, and is more subject to break the sea on-board, on account of the ship's continual falling off: because, in that movement, she gathers way by yielding to the impulse of the gale, and is afterwards recalled to the wind by the helm (§ 50) ; so that, in springing the luff, she meets the wave which comes from to windward.

Lying-to under a Mainsail.

The ship does not, in this situation, fall off so easily as in the last-mentioned mode, because its effect passes abaft the centre of gravity of the ship (§ 41) ; but it keeps the ship more to the wind, and consequently occasions less lee-way.

Lying-to under the Mizen.

Under the mizen ships keep better to the wind than under any other sail, because it is farther abaft the centre of gravity (§ 40) than any of the rest ; consequently ought to keep the vessel from drifting more than any of the others ; but it is inconvenient, should you have occasion to veer suddenly.

Lying-to under the Main-staysail.

Under the main-staysail a ship will not make so much lee-way as under a fore-sail, because its effort passes very near the centre of gravity ; but it will however cause her to drift more (§ 31.) than the main-sail (§ 41 :) so that this mode of lying-to is a mean between the two others, and is preferable when it blows strong enough for that sail to support the rolling of the ship. It ought likewise to be preferred, because the ship will veer under that sail, the action of which passes at a small distance from the centre of gravity (§ 31.) and the power of which overcomes the resistance that all ships meet from the fluid under their lee ; a resistance which always gives them a great inclination to fly up in

the wind, when it blows hard, or when under a heavy press of sail.

Lying-to under the Fore, Main, and Mizen, Staysails.

All the preceding modes of lying-to have their peculiar faults; but the preferable way is under the fore-staysail, the main-staysail, and mizen-staysail; because, under these sails, the ship will steer (§ 46.) and is in a better situation for veering than under any other sail; for, only haul down the mizen-staysail, and put the helm a-weather; when the two other sails, being before the centre of gravity, (§ 30 and 31.) will cause her to fall off; she will then soon gather way and steer easily.

Should the gale continue very hard, and one of these staysails be blown away, the loss is not of much consequence, as the courses, in case of an emergency, are ready to set; whereas the courses are not so readily replaced when lost. This mode, therefore, appears preferable in every respect,* whether you wish to veer or keep your wind: because, if the ship does not sufficiently keep the wind, you may haul out the balanced mizen (§ 40.) or take in the fore-staysail (§ 31.) or even the main-staysail. One of these staysails, before the centre of gravity of the ship, is sufficient to make her veer as soon as the after-ones are suppressed. There are, besides, these following considerations for so doing: The ship will carry sail better; because, as the centre of effort of those on her is very low, she drifts less, holds a better wind, and goes faster through the water (§ 25 and 46;) and these three or four sails are so situated as to give the whole body of the ship play, which will strain her less than when under one single sail, which cannot by itself work it from aft forward.

Demonstration.

The object of lying-to being to keep to windward as much as possible, when foul winds and tempestuous weather prevent you from pursuing your course, it follows, as much sail should be carried as is consistent with safety; and, as you are often unable to set more than one sail, it is trimmed sharp, that the ship may keep her wind as much as possible. It is likewise for this reason that the helm is at the same time put a-lee; because the ship, having but very little way, (§ 46.) falls off, by yielding from time to time to the impulse of the wind, which unceasingly acts on her; but, as soon as she has fallen off, she is brought-to again by the effect of the rudder (§ 50.) which must act upon her if the water has the smallest power upon it.

* Should the sea run too high for the lower staysails to keep the ship steady, a close-reefed main-topsail (particularly if it has four reefs in it to come close down to the cap) will be found to answer the purpose admirably

The same happens in lying-to under the three staysails, (though the ship makes more headway under any other sail,) because the effect of these sails is better distributed (§ 46.) than when one only is set; notwithstanding they have not power enough to procure the ship much velocity, nor to make her steer properly: the helm is therefore put a lee as in lying-to under any other sail. It is always more advantageous to keep the ship under way and lively, than to let her lie at the mercy of the wind and waves.

When the wind is so violent that no sail can be carried, you lie-to a-try; that is to say, under bare poles and ropes, which serve instead of sails, and lash the helm a-lee as usual.

OF SOUNDING IN FAIR WEATHER, WHETHER CLOSE-HAULED OR GOING LARGE.

Close-hauled.

If close-hauled, brail up the mizen and mizen staysail, let go the main-sheet that the sail may shiver, put the helm a-lee, and back the mizen-topsail by bracing it square. The head-sails, as well as the jib and staysails, are to be kept in their first situation; recollecting to haul tight and belay the lee braces. When the ship has nearly lost her headway, though continuing still to come to the wind, you catch that moment to heave the lead, and it is to be hauled in again with all possible dispatch. To fill again, haul aft the main-sheet, trim the mizen-topsail, and right the helm.

Going Large.

In going large, you have only to put the helm a-lee, to brail up the mizen, and to belay the lee-braces quite tight, to prevent the yards having too much play when the sails are shivering. It is impossible to tack in this situation, as the jib and head-sails are always in action (§ 31;) and the square-sails, soon coming to shake, on account of their sheets not being tacked, they lose all their power, and the ship is soon at a stand.

Demonstration.

The mizen and mizen stay-sail are brailed up, because their effect to bring the ship to the wind would be too powerful (§ 40.) For the same reason, the main-sheet is let go (§ 41.) though there is another reason for it, which is, that it destroys the equilibrium that existed between the sails forward and the sails aft (§ 46 and 49;) whence the rapidity of sailing is diminished, as well as the effect of the helm, which acted (§ 50.) to bring the ship to the wind, while at the same time it opposes her velocity (§ 59.) The

mizen-topsail is braced a-back, to impel the ship a-stern in the direction of her length (§ 36;) so that her headway, being now much diminished, the ship, by the effect of the rudder, ranges to the wind so far as to shake the main-topsail and the sails on the foremast, which, to that very moment, had acted to keep up the celerity of sailing (§ 32 and 41.) But, as the effect of the rudder is very faint, since the velocity of the ship is greatly diminished (§ 58.) when the sails have lost their action, the ship must stop, and is not able to come sufficiently to the wind, to bring her about, because the jib and staysail sheets, being hauled aft, oppose the effect of the helm; so that she rests, as it were, motionless for an instant, which must be seized to throw the lead with the greatest dispatch; because, should the ship fall off by the effect of her jib and staysail, which are alone in action, the other sails might suddenly fill and give her headway, which would prevent you from getting soundings, were you too dilatory in throwing the lead. Whether you do or do not find any bottom, haul in your line as fast as possible, and seize the opportunity of the ship's falling off to fill and stand on again.

If the ship, in spite of the disposition given her, should come head to wind, (which could only happen from her having preserved some velocity,) the helm must be kept a-lee, but the head-sails should quickly be laid square, and the jib and staysails hauled down; then the ship will soon after be found to veer.

ANOTHER METHOD PREFERABLE TO THE FORMER.

Going Large.

Brace the head-sails square, haul down the jib and staysails, without stirring the after-sails, and put the helm a-lee. While the ship has still a little headway, heave the lead from the place where you haul it in; the lead will go first a little a-stern; but the ship, being head to wind, will soon herself go a-stern right upon the line; and, as the helm is a-lee, the ship easily veers. But, if you wish to keep her to longer, right the helm and haul the mizen out, to prevent the ship's falling off.

If you have studding-sails set, they must be hauled down, particularly the lower, because, should the wind take them a-back, their power on the boom might bring the ship round entirely; for, they act on a lever without the ship, the fulcrum of which is on the outside of the vessel before the centre of gravity. If, however, the helm is continued a-lee till the ship falls off, she will not come about, because then the vessel goes a-stern with great velocity, and the rudder acts powerfully to make her veer; but the fact is, that the ship will go a great deal sternway, and continue so much longer.

Close-hauled.

If close-hauled, or a very little from the wind, the helm is to be put a-lee; and, the instant the sails are taken a-back, the headsails are to be filled by briskly bracing them square, without waiting for the wind being right a-head; then, a little before the ship has lost her way, heave the lead from the place where you haul it in, and then proceed as before.

ON SHIPS DRIVING.

When it happens that there is not sufficient room to work in a tide's way, through a crowd of ships, or in a narrow channel, but that a ship must drive by the help of the tide, it may be done, provided the tide be strong enough, in proportion to the wind. This art consists of keeping the ship in a fair way, by a management of the rudder and the sails.

To Drive to Windward when the Wind is Against the Tide.

If the channel is sufficiently broad, the ship should be drifted broad-side to the wind, as the tide will then have the greatest power on her; and, could the ship be backed a-stern or shot a-head at pleasure, she might be kept drifting upon the same tack with safety; but ships in a tide's way can never be backed so far a-stern as they will shoot a-head. At the first of a stern-board a ship will go briskly a-stern, but will soon fall off, and drift with the wind abaft the beam, forging a-head; for this reason she must be drifted with the helm a-lee. It follows, as a ship will shoot more a-head than she can be backed a-stern, that she will at length arrive at the opposite shore, when she must be stayed or veered, and drifted upon the other tack. If she is to be stayed, (which is preferable, because less drift will be lost by it,) let the sails be filled in time, to give the ship sufficient headway to bring her about; then put the helm a-lee. Should she come about, the sails and helm, having now a proper position for a stern-board upon the other tack, need not to be touched till her sternway ceases, when the helm must be shifted a-lee; but, should the ship refuse stays, then brace sharp round the head-yards, and boxhaul her, by which method she will lose much less drift than by veering.

If the ship, now drifting broad-side, is approaching a narrow channel, where drifting in this position, she must be veered and dropped stemming the tide, stern foremost. In this case, that the drift may be as much as possible, it will be necessary to take in

sail, and reduce the ship's headway till she has only steerage-way left; thus a vessel may be dropped through a fleet of ships at anchor without danger.

To Drive when the Wind is Across the Tide.

Should the wind be little across the tide, a ship may be easily drifted in the fair way, with her head towards the weather-shore; for thus it will be found that she can be backed and filled at pleasure, and generally be drifted with the sails shivering, in which position they oppose least power to prevent the drift.

It frequently happens in serpentine rivers that the tide sets across; in this case the ship must be drifted with her head to the side from which the tide sets. These sets are best discovered by observing the opening or shutting of two objects in the direction of the channel.

UPON SETTING AND TAKING IN SAILS IN BLOWING WEATHER.

To Set a Mainsail.

Before the sail is loosed, let the double block of a tackle be made fast to the weather-clue, and the single block be hooked low down upon the chess-tree, and the fall led aft. Then man well the main-tack and fall at the same time; and, when the sail is loosed, ease away the weather clue-garnet, let go the bunt-lines and leech-lines, bowse down upon the tackle, and take in the main-tack: the main-tack being down, haul aft the sheet, brace up the yard, and haul the main-bowline.

To Set a Foresail.

A foresail is set after the same manner as a mainsail; but, as the fore-tacks generally lead double, they are a sufficient purchase without the aid of a tackle to the weather-clue.

To Set a Topsail.

Let a tackle be in readiness to clap on either sheet, as may be required. First, man the lee-sheet; and, the sail being loosed, ease down the bunt-lines and weather clue-line, and haul home the lee-sheet; then haul home the weather-sheet, hoist the sail, and brace up as required.

Should the wind be quartering, the lower and topsail yards should be braced well into the wind, before the sail is sheeted home.

To Take in a Course.

Man well the weather clue-garnet, ease off the tack and bowline, and run it up ; then man the lee clue-garnet, bunt-lines, leech-lines, and weather-brace ; and, being all ready, ease away the sheet, haul up the clue-garnet, bunt-lines, and leech-lines, and round-in the weather-brace, till the yard is pointed to the wind. Then haul tight the trusses, braces, lifts, and rolling tackle, and let the hands furl the sail.

To Take in the Foresail in the time of Veering.

When the ship begins to veer, the yard being kept braced sharp up, let go the tack and bowline, and haul up the weather clue-garnet. When the ship is nearly before the wind, the bunt and leech lines, and the other clue-garnet, may be hauled up ; and, if the situation admits of it, and occasion requires, the ship may be steered with the wind on the quarter, till the sail is secured.

To Take in a Topsail.

There are many opinions upon the best mode of performing this. Some approve of clueing up to windward first, and others to leeward. If the weather-side is to be clued up first, the weather-brace must be rounded well in, and the yard got close down upon the lifts, otherwise the lee-rigging will be in danger of being carried away by the great pressure of the lee yard-arm. If the weather-brace can be rounded well in, and the yard be got close down, it will be best to clue up to windward first, for thus the sail may be taken in without a shake ; but if the weather-brace cannot be hauled in to ease the yard off the lee-rigging, recourse must be had to clueing up to leeward first. In this case, it will be best, if hands can be spared, to man both the clue-lines, bunt-lines, and weather-brace, at the same time ; thus, when the lee-sheet is eased off, the weather-brace may be hauled in with ease, and the yard laid to the wind ; and, when the lee clue-line is half up, ease off the weather-sheet, and run up the weather clue-line ; then haul tight the lee-brace, bowse tight the rolling-tackle, and furl the sail.

To Take in a Jib.

Man well the down-haul, let go the haliards, ease off the sheet, and haul down briskly ; and, when the sail is close down, ease

away the out-haul, and haul the sail in to the bowsprit-cap ; then let it be stowed away in the fore-staysail netting.

To Haul in a Lower Studding-Sail.

To haul in a lower studding-sail, blowing fresh, lead one of the sheets clear aft, and man it well ; then lower away briskly the outer haliards, to spill the sail ; ease off the tack, run in upon the sheet, and lower away the inner haliards as required.

To Haul down a Topmast Studding-sail.

Man well the deck-sheet and down-haul, ease off the yard-sheet, and haul the yard close out to the tack-block ; then ease away the tack ; and haul down both upon the deck-sheet and down-haul.

To Brail up and haul down a Main-topmast Staysail.

Man well the lee-brail and down-haul, having a few hands to gather in the slack of the weather-brail ; then let go the haliards, ease off the sheet, and haul down and brail up as briskly as possible. When the sail is down, let go the tack, and stop the sail over to the lee fore-rigging.

To Brail up a Mizen.

Man well the lee-brails, and in particular the throat-brails, which should have a whip-purchase ; ease off the mizen-sheet, and brail up briskly, taking in at the same time the slack of the weather-brail. After the sail is hauled up, stop its foot by passing the gasket round to leeward, which will spill it.

To Take in a Topgallant-sail.

The lee-sheet must be started first ; for, if the weather-sheet is first eased off, the yard will fly fore-and-aft.

To Unbend a Course.

First furl the sail, then cast off the rope-bands, and make them fast round the sail, clear of the gaskets. When the rope-bands are all off, ease off the lee ear-ring, and lower down the sail ; and when the people upon deck have got hold of the lee-part of the sail, ease away the weather ear-ring.

To Unbend a Topsail.

First cast off the points of the reefs, keeping fast the ear-rings ; then furl the sail, and cast off the rope-bands, which make fast round the sail, clear of the gaskets. After this, cast off the lee ear-rings, and haul the lee-side of the sail into the top ; then haul in the weather-side. Now unbend the reef-tackle pendents, buntlines, and bowlines ; bight the sail snugly up together ; and send it down by the clue-lines to windward or leeward, as most convenient.

On Scudding or Bearing Away in a Storm.

When the waves run high, and sudden necessity requires to bear away, it should be considered that the lower sails forward, which the ship can be veered under when she comes before the wind, may be becalmed by the height of the waves breaking violently against the stern ; and that therefore a close-reefed maintopsail should be set to catch the wind, because it is a loftier sail, and may always be kept drawing full above the waves. This increases the ship's headway so much, that the waves will not strike her abaft with so great a velocity as when her headway is less.

Hence it follows, that, when going to scud before high waves, the close-reefed main-topsail should be the last square-sail taken in in a laboursome ship.

Of a ship Overset on her Side.

A common but not always a certain method to recover ships from this dangerous situation, is to cut away the masts : however, as this expensive method may fail, stopwaters only, on the lee-quarter at sea, may cause the ship to veer ; or, where there is ground, an anchor or anchors, dropped from the lee-bow, may bring the wind a-head, and take the sails a-back, so as to cast the ship on the other tack, and bring her upright.

CHAP. XII.

ON A SHIP'S COMING TO ANCHOR FROM SEA, INCLUDING SOME REMARKS ON REVIEWING OR SURVEYING A SHIP PREVIOUS TO HER GOING TO SEA.

The officers and ship's company dressed. The buoy and buoy ropes on the anchors, a range of the cables up. The messenger passed for mooring ship, and the nippers* in their places.

Tackles ready for swaying up the lower yards. If it blows hard the sheet cable bent, and the anchor over the side. If necessary, double bit the cables, have the dog-stoppers up, and good seamen stationed to attend them, axes on the forecastle to cut away the stoppers if they hold.

If the wind and tide answer, veer away and moor at once. The guns unshotted, half ports off, the studding-sail geer unrove. The hoses to be ready for watering and the launch fitted. As soon as the ship is at anchor, sway the lower yards up, and square all the yards, see that the top-mast and top-gallant-masts are properly stayed and upright ; the guess wharp and booms ready to get out, scrub brooms ready to scrub the bends ; all the mats taken down, if the ship is to remain long in port. The sentinels on the gangways. If going into a port where a Commodore is lying, the guns should be ready for saluting, or the people for cheering.†

If the ship be running in before the wind to anchorage, and there is no probability of baffling winds, to require bracing up, the lower yards may be swayed up and squared ; the travelling backstays hauled up in the tops, the topsail sheets and tacks singled.

When the sail is shortened, care should be taken that nothing impedes the movement, and the ropes should be so distributed that the people may have good room to work in ; one topsail-haul-yard overhauled, and the fly blocks hauled up, and laid in the af-

* The captain of the foretop should be ordered, after the ship gets under weigh, to dry all the nippers, make them up, and return them to the captain of the hold, as they would otherwise rot, and if not taken care of, would be appropriated to every idle purpose.

† In manning the rigging for cheering, the people should be chosen by their size, to stand together on the same ratlines, observing the space of two or three ratlines between each tier ; the men should be drest alike, the marines at the time drawn up on the gangway without their arms. After the three cheers have been given, if the Commodore returns the same number, it must be answered by one ; if he returns but one, no farther notice to be taken, and the people called down.

ter part of the tops. If the topsails only are to be taken in, the topsail-yard men may be in the tops to man the buntlines ; good hands should be stationed at the braces, who ought to gather in the slack of them as the yards come down. If the wind does not blow too hard, or there is too strong a tide running, the cable may be unbitted to facilitate veering away for mooring. In furling, every precaution should be taken for being quick in following the Commodore's motions when he loosens sails. The bowlines should be overhauled and bent to the buntline-cringles. the cluelines and buntlines hauled up in the tops, and clear for running ; the fore and main buntlines hauled up on the fore part of the yard, and overhauled for running ; the studding-sail booms ready to trice up, and harbour sheets ready to carry out on the lower yard, in case the topsails should be hoisted.

ON REVIEWING A SHIP BEFORE PROCEEDING TO SEA.

We frequently see ships of war commissioned, and ordered to be fitted for sea with the greatest despatch ; sometimes an emulation exists between two ships preparing at the same time, and every thing is made subservient to equipment ; the consequences are, that the ship is badly fitted, the hold carelessly stowed, the rigging not stretched, the stores deficient, the sails not fitted, and nothing to resist chafing, or the inclemency of the weather. The commanding officer at the port is naturally pleased at the exertions of the captain, without, perhaps, reflecting on what the condition of the ship will be when she gets to sea.

As for example, a storm comes on, the sails split ; to replace them is not possible ; the rigging stretches ; a raw undisciplined ship's company, whose abilities have not been ascertained, cannot be depended on.

In this situation, the ship on a lee shore, is threatened with becoming a wreck ; or in another point of view, still more dismal, she falls in with an enemy,* the crew are not quartered, the cartridges are empty, the stores are not arranged, and the most dreadful confusion prevails. Shall the American flag be tarnished by flying from an equal, or perhaps an inferior force of the enemy ? To prevent so disgraceful an event, would it be improper that every ship of war should be reviewed, previous to her going to sea, by different officers for each department ; (or in another phrase) that every officer's charge should be surveyed by other officers of his own rank.

For example, three captains might examine the established rules and regulations of the ship, the general system of discipline, the

* It is an acknowledged fact, notwithstanding the greatest attention in fitting a vessel for sea, she is never in readiness till after leaving her port a week, and in a ship of war the odds is as 3 to 4.

strength and abilities of the crew in the various manœuvres of exercising the great guns, of making and shortening sail, reefing and furling. Three masters might inspect the stowage of the hold and cables. Three pursers might, in like manner, inspect the quantity of fuel, candles, and the other necessaries and provisions. Three surgeons, that the necessaries allowed by government for the use of the sick are complete, that the medicine chest is properly furnished, and the instruments of a proper quality and in good order, Three boatswains should inspect the sea stores, the stowage and fitting of the spare sails, see that the mats are in their places, that the rigging leads fair, and that every thing in their department is appropriated to the greatest advantage. Three gunners and carpenters, that their stores are complete, that the store rooms are properly arranged, and every thing disposed of for the general convenience of the ship.

When the survey is finished, separate reports may be written out, showing the opinion of each class on the state and condition of every department, and delivered to the Commodore or senior officer. To this system we are aware that objections will be made ; it will be said, that it will interfere with the responsibility attached to every commanding officer, that it would repress the ardour and spirit of the service, and operate as a stigma on officers, which their general zeal renders unwarrantable. On the contrary, if it was established into a fixed rule, no individual could conceive himself implicated by it. The exertions of officers would be insured, embezzlement of stores prevented, and a most certain method introduced of having every ship of war prepared both for opposing the enemy and for resisting the effects of bad weather.

As every private consideration should yield to public advantage, perhaps no plan can be adopted more likely to meet the exigences of the circumstances treated of, than the mode here proposed. A good officer, who is thoroughly acquainted with his duty, whose experience has improved on the system usually pursued, would consider it as the proudest and most satisfactory testimony of his abilities, to find that his zeal and attention had been represented to the navy department. It can only be objected to by those who are ignorant of their profession, by the very persons most liable to be deceived, and to whom every precaution should be most particularly directed.

OF MAKING AND SHORTENING SAIL.

To make all sail, from being close hauled (with reefs in) before the wind ; square the yards by the lifts and braces ; bowse taught the trusses ; send the people up to let the reefs out ; and send down the studding-sail geer ; the people on deck getting the studding-sails ready, whilst the men aloft are letting out the reefs.

The reefs being let out, hoist the top sails ; when hoisted up, loose and set the top-gallant sails ; get the royals on the top-gallant yards ; bowse taught the topsail-lifts, *burtons*, and rolling tackles ; settle a foot or two of the haulyards, to let them bear an equal strain, which will add both to the security and appearance of the yard. The studding-sails being ready to send up, and the booms to rig out, man the boom-tackle-falls, topmast, and top-gallant-studding-sail haulyards. Rig out and hoist away together, get the studding-sails on the yards, cut the stops, and then man the lower and topmast-studding-sail haulyards on deck, and the top-gallant-studding-sail haulyards in the tops ; when ready, hoist away altogether. This evolution might certainly be performed much quicker if the sail was set as it becomes ready, but the beauty of appearance, and regularity in the movement would be sacrificed, which, if time will allow, seems better avoided, as a ship of war should, if possible, always be systematical in her manœuvres, as it gives a dignity (if I may use the expression) to her rank, and marks the distinction between herself and a merchant vessel.

Officers, in their respective stations, a midshipman in each top.

Top-men, shake out reefs, loose top-gallant-sails, royals, staysails, &c. hook the burtons on the topsail yards, and set the top-gallant studding-sails.

Forecastle-men, loose the jibs, rig out the topmast studding-sail, and swinging booms, and set the topmast and lower studding-sails.

Gunners, rig out the main-topmast studding-sail booms, and set the sails ; after-guard, marines, waisters, &c. in their respective stations. For shortening sail, in the same manner.

In making sail upon a wind, whilst the top-men are letting out the reefs, haul on board the tacks, and set all the staysails, which, with despatch, may be completed by the time the reefs are let out. Men should be ready* to loose the top-gallant-sails as soon as the topsails are up ; this may be performed in three movements, as follows : 1st. set the courses and hoist the staysails together ; 2d. hoist the topsails ; 3d. loose and set the top-gallant-sails.

SHORTENING SAIL.

When every sail in a ship is set, the room will not permit all to be reduced at the same time ; some part must be neglected. On this account it appears best to make two movements, that the whole may be performed with promptitude and regularity. In the

* A top-gallant-sail should never be loosed till the topsail-yard is hoisted up, it looks slovenly, and hurts that symmetry and regularity so essential to good order ; the men should cast off the gaskets, and hold up the sail in their arms.

first instance, therefore, haul down the studding-sails,* take in the royals, and rig in the booms ; when this is finished, haul up the courses, take in the top-gallant sails, haul down the jib and stay-sails, and brail up the spanker.

If the ship is to be brought to the wind, the back-stays should be set well up ; if it is necessary to reef, as the ship is brought to the wind, and the sails begin to lift, lower away the topsails. If the ship is to lie to† keep the main-yard square. In bringing the ship to the wind, be careful that it is done by degrees, for if the helm is put hard down at once, she will, if it is smooth water, come quite round.

OF REEFING TOPSAILS.

The people should be aloft in the topmast rigging ready to lay out when ordered. If going before the wind we must depend entirely on its strength, whether it will be necessary to bring the ship to or not, for that purpose : in which case it must be done just so much as to spill the sail for lying quiet whilst the men are on the yard. As the ship comes to, lower the topsail yards, bowse out the reef tackles, and haul taught the buntlines ; keep the yard square ; when secured, send the people out. In moderate weather, reefing before the wind is performed as at all other times reefing upon a wind is done. To reef upon a wind, man the weather brace, luff the ship up that the weather leech may lift, let go the bowline and lower away. In taking the third reef in, it is usual, when the wind blows fresh, to start four or five fathoms of the weather sheet (to ease the reef-tackle-pendant) and to haul up the clueline and buntlines. When the course is not set, the lower yard‡ being sufficiently squared will answer the same purpose. In close reefing, the weather clueline is generally hauled quite up. The principal points to be attended to in reefing a sail are, to spill it by the braces and the helm, so that the people may perform their duty with ease, and free from danger ; hauling forward on the lee bowline prevents the sail from getting over the lee yard-arm, but the following method of taking a sail in, will have the same effect. Keep the ship a point free, haul up the lee clueline and buntline ; when up, haul up the weather clueline ; when half up let go the bowline and haulyards ; round in the weather brace, bring the ship to the wind, and spill the sail. Leech lines are very convenient for spilling topsails.

* As soon as the studding-sails are down, the burtons should be taken off the yard, and the jiggers off the lifts.

† If it blows strong whilst lying to, settle some of the topsail haulyards, that the top-brim may neither cut nor chafe the sail.

‡ When this is done, care must be taken to bowse the trusses taught, and to haul taught the braces, or else the yards will fly about.

ON STRIKING TOPMASTS.

Topmasts should be struck but in few instances without first getting the top-gallant-mast on deck. It is a prevailing idea, but certainly without much foundation on reason, that the rigging of a topmast when down, counterbalances the desired effect of striking it, and the immense lever only which a fidded topmast constitutes, bespeaks the utility of striking it, particularly if there should be a swell. If pains be taken to bowse the rigging well down afterwards, and frap it round the mast, the quantity of wind it may hold may, perhaps, be greater than if fidded, but certainly not so much as to render the effect of striking the topmast useless.

Topmasts are most commonly struck in an open roadsted, when the wind blows directly in, and no possibility exists of getting to sea: to render the want of topsails requisite, or when the safety of an anchorage is preferred to that of the sea. The topmasts being unfidded, if the lower yards are up, they should be lowered together, till the top-tackle blocks are a few feet from the catharpins, so that if required, the top-tackle-pendants may be let out to lower the masts lower down. In swaying up topmasts and lower yards, the topmasts are generally run up till the fid-holes are in sight;* then the lower yards, bringing the main geer to the capstern: otherwise, if strong enough, sway both up by hand, when a-block, fid the topmasts: stay them and step up the rigging

ON REFITTING A SHIP, OR GOING INTO DOCK.

Previous to beginning to refit, every running rope, shroud, and backstay, should be examined, that is likely to want replacing, and a memorandum made of the whole, to prevent confusion when stripping; all old stoppers, tackle-falls, and unserviceable rope, should be returned for new. The lower yards, blocks, and sails, should be sent on shore as soon as possible, to have the battens taken off and examined, to new strop† the blocks and to cut out the new sails.‡ Previous to sending the sails on shore, all the points and robands should be taken out, as they will not return them if sent to the sail-loft.

All the boatswain's stores should be sent on shore together, that one survey may answer for the whole. It is recommended

* When the top-masts are high enough, if the top-gallant-masts are down, let hands go up and place the rigging, and be ready to receive them as soon as topmasts are fidded.

† The riggers in the dock-yard new strop the blocks, and begin about them in rotation as they are sent on shore.

‡ The sail-makers will not begin on the new sails till the old ones have been surveyed.

not to send shrouds or backstays on shore to be surveyed, as they are frequently condemned, although serviceable, which occasions a great deal of trouble, and, in the winter, is sometimes dangerous. The ship's effects should be sent on shore as soon as possible, and given to the master attendant for the boatswain's charge, and to the master shipwright for the carpenter's ; the new work done in a ship by the navy-yard men is always primed for painting by themselves, and when the shipwrights' and joiners' work is finished, the painters will be ordered to paint the ship on application. Previous to beginning to strip the ship, prepare tallies for the sails and rigging, take the first opportunity of drying the sails, particularly in the winter season, as it will otherwise delay all the other work. When ready to begin, if the ship is to go into dock, the main-yard is to be kept up to get the guns out, and to clear the hold. The first lieutenant should make his arrangements as follows : to each lieutenant attach a proportion of mates and midshipmen, with a division of the ship's company, reserving a certain number of men, according to the size of the ship, denominated riggers, to be aloft to take off the rigging ; then, with the people divided as above, let sub-divisions, under midshipmen, be employed to sway off, receive, make up, tally, and hand into the lighter, the rigging from the mast-heads.

The top-men are generally employed aloft till the tops are gotten off, then the gunners and forecastle men to strip the lower masts. Careful hands should be employed to tally the rigging, that no mistake may happen. This system more immediately belongs to a ship that is stripping only ; for, in preparing to go into dock with dispatch, the executive officer must attend to those things first which will facilitate the service generally. Much will depend on the weather, and on being supplied with craft to take away the guns, powder, stores, empty casks, &c. The spirits, wine, and provisions, are never received into the victualing office unless a ship is to be paid off, or they are condemned by survey ; they must therefore be taken on board the hulk, and properly secured. The first thing generally attended to, is starting the filled cartridges into the powder casks, and sending all the powder and musket cartridges on shore ; then the guns and gunners stores ; but I would advise the executive officer to calculate the number of things he can do at one time ; as, for example, if the guns are first taken out, every thing is at a stand for them, and all hands are confined to that single point of service ; whereas if the ship was unrigged, the boatswain with a division of the ship's company, might be spared, out of a full manned ship, to return the sails, rigging, &c. whilst the remainder of the crew are employed in getting them out ; and thus two pieces of duty are performed at the same time ; which would otherwise have occupied separate intervals. If the ship is weakly manned, and has only a sufficient number of men to get the guns out, this should be the first object attended to, as it will afford more room afterwards to work in.

The leading principle should be, to proportion the people to the work, and to undertake as many things at the same time as the room on board and the number of hands will admit. The executive officer should calculate the quantity of work he expects to be performed in each separate day, and give his directions to the officers in their departments, to apply for lighters as he supposes he shall want them, according to his arrangements. Great care should be taken if the ship is only to be docked, of all the masts, points, robands, gaskets, &c. and every thing which may be useful in her equipment. To give an idea of the regularity which ought to prevail in stripping, I shall state the manner in which it should be performed: supposing the sails to be thoroughly dry, (for if they are not the master sail-maker will not receive them, and it will be necessary to send people on shore to dry them,) send for a covered lighter to carry the sails to the navy-yard. On beginning to unbend them, the robands being all cast off, ease the earings down together, and lower the stay-sails down after unreeving the stays from the hanks; prepare a platform in the lighter of the running rigging to lay the sails upon, and get them in as soon as possible, that the deck may be clear of lumber. Some hands at this time may be employed to cut the seizings of the ratlines off the top-mast-rigging, to unreeve the top-sail-ties, and reeve hawsers, to get the top-sail-yards down; and to unreeve the top-gallant shroud. When the sails and running rigging are made up, tallied, and put into the lighter, get the top-gallant mast down on deck, and top-gallant rigging, then get the top-sail and cross jack yards and gaff down, and sprit-sail-yard in; unreeve one of the top-tackle pendants, and reeve a hauser in lieu. If the ship is going into dock, the main-top-mast may be kept up till the main-yard is lowered down; when ready, unfid the top-masts, and cast the lashing off the heel of the jib-boom; lower the lower yards and top-masts down together, and get the jib-boom in at the same time. The top-masts being low enough to unrig, the lower yards to launch overboard, some hands must be employed to unrig the lower yards and top-masts, tallying,* making up, and carrying away the rigging. When the top-masts are unrigged and the cross-trees got down, hang† the top-mast by the hawser or top-rope, whilst the opposite top-block is unhooked and lashed to the side of the masts, for getting the cap off; when it is done, bowse it well taught, and come up the other, which must be lashed in the same manner, to be able to sway on both. When the top-blocks are properly lashed, lash the lower caps to the top-mast-heads, and with a capstan bar, slung at the after part of the masts

* The shrouds and backstays are marked as they go over the mast-head, and numbered by knots made on a rope-yarn; as for example, the first pair is numbered with one knot, the second by two, and so on for every additional number.

† The top-blocks may be unhooked and lashed previous to commencing, which will add to the appearance of despatch.

for a bumper, get them off by mutually swaying the mast up and bumping with the bumper, that no part may take against the masts. Some hands may now be employed in the lower rigging, to cast off the ratlines, taking care to leave them only on one pair, (the second is commonly preferred.) When the caps are got into the tops and unlashed from the top-masts, lash the span-blocks on the lower masts-heads, and reeve girtlines for getting the tops off; get the top-masts either on the booms, up and down the lower masts, or launched overboard; the first if the lower masts are to be shifted, or the step lifted; the second if the lower rigging only is to be overhauled, and the carpenters are perfectly certain, that there is no defect in the masts; and the third, if the mast is defective, if the ship is to be paid off or the spars sent to the dock-yard; then with the girtlines rove for getting the tops off, sling the caps, weigh them, and bowse them out of the tops by the fore and aft girtlines; lower them either into the lighter or on deck. Send the carpenters up to unbolt the tops,* which may now be gotten off. If they are to be sent on shore, lower them into the lighter, otherwise lash them up and down the mast securely. The tops being off, and the rigging in the lighter, unbolt the fore-mast cross-tree, sling it and send it down. The gunners and forecastle men should now go up to lash the mast-head and girtline blocks, to get the stays off, and then the rigging down, which either lower into the lighter, or on deck. The runner pendants in a roadsted should be immediately overhauled and got over again, that the runners may steady the mast whilst the rigging is off, the ship being unrigged, which is but a few hours work, if she is to go into dock, some hands should have been employed in starting the water whilst the ship has been unrigging; it will, therefore, require a short time to pump her out, during which intervals the fore and after hold may be worked at; then the cables got out; observing whilst the ground-tier is breaking out, which is a tedious work for a proportion of men to perform, the stores may be returning in the dock-yark.

When the hold is clear of casks, half tubs must be slung at the different hatchways, to get the ballast up on the lower gun-deck, which is thrown to a man on a grating, slung on the outside of the port, who again heaves it into the lighter.

REMARKS ON PAINTING A SHIP.

If a ship is alongside a hulk in harbour, painting her should be deferred till the last thing, and then, if time and circumstances

* It is the custom in some ships not to get the tops off; this is not only a slovenly lazy method, but a negligent one, as the trussle-tree and cross-trees, or even the top may be defective or injured, which it will not be possible to discover unless gotten off.

will permit, she should be hauled off to moorings, and ship-keepers only left on board. If application be made, painters* will be sent from the dock-yard to paint her, but as it may be performed equally as well by the ship's painters, it is better to demand the paint, and have it done by the persons on board.

Great pains should be taken in mixing the paint, which should be tried on a clean board previous to laying it on, recollecting that the colour will always appear two or three shades darker than when dry. If the paint is mixed too thick it soon dries, but peals off, and does not go so far as it would if mixed thinly. If, however, it has not a proper consistence, it will neither make a good appearance nor last long, and, from the quantity of oil, is a long time drying; a painter or man of sufficient judgment is, therefore, required to mix the paint. Spirit of turpentine is frequently put in to make it dry soon, but the sun always extracts the spirit, and makes the work blister. The following is a simple, easy, and approved method of mixing paint.

Take the proportions of yellow and white paint, oil and litharge, that will make it of the intended colour and consistence; put them altogether into one of the boatswain's fish kettles, stir them well up, and boil the composition, then pour it off, strain it through a bread bag, and lay it on warm; the warmer it is laid on the better. Care should be taken to mark the lines before commencing,† that no mistake may occur.

If a streak is painted, it should be done first with the upper works: the sides should be well scraped, and where any grease may have lodged, it should be scrubbed with warm lime water, and not a particle of dirt or dust suffered to remain. Various modes are pursued in painting ships' sides; but the following appears the most general and approved. A yellow streak from the ribbands of the channels forward and aft, cutting a line through the ports: another streak on the moulding above it. The broad yellow from the lower part of the upper deck port-holes to the lower part of the quarter gallery; the lower part of the yellow to be painted in a straight line; the upper part with a small sheer, carried entirely forward to the cut-water.

Frigates are generally painted with a bright yellow side, and black upper works; the yellow about two inches above the upper part of the ports, and carried down to the line of the lower part of the quarter gallery. The muzzles of the guns and port-cells black.

Tompins in the waist white, and those belonging to the guns on the quarter-deck black, to prevent the height and irregularity of the carronades from being observed. The bends blacked

* Ships are painted by contract, and unless the captain of a private ship will pay the painter for additional white to be mixed with the yellow, it is so very dark a colour that it makes the ship look very dirty and dismal.

† Small battens or sinnets, are generally nailed on, to point out the lines as a guidance to paint by.

with varnish and oil, mixed and boiled ; otherwise with varnish and tar.

The first mixture carries the best appearance, but is not so durable or serviceable as the latter ; but the three different compositions are frequently united together, and this, perhaps, forms the best.

This general rule may always be observed. If it is desired to make a ship look long and low, the yellow part should be carried low down and painted narrow ; if on the contrary, it is wished to make her look lofty and short, the yellow part should be broad and carried high up.

PARTICULAR POINTS REQUISITE TO KEEP A SHIP CLEAN.

Whatever conduces to the preservation of health on board a ship should be attended to with the utmost strictness. That very anxious care for the preservation of salubrity, exhibited by some officers, has sometimes, however, led them into extremes, as we have seen exemplified in the article of washing ; which has been, in some ships, repeated with the same invariable constancy in the winter as in the summer, in cold climates as in hot. On the contrary, in some ships the officers seem to have fear that the seamen, who withstand the inclemency of the weather in a half-dried pea-jacket upon deck, should be affected by the humidity of his birth below, arising from its being washed ; and this salutary operation has consequently been entirely prohibited. By not attending to the principles of a case, we are led into error. Excessive washing, in improper seasons and climates, will produce damps which occasion colds, the forerunner of most disorders generated on board ships ; but no washing at all must render a ship loathsome, by suffering the generation of filth and vermin.

The lower deck of every ship, but more especially that of frigates and sloops of war, ought to be particularly attended to ; as the small space which contains so many men requires the greatest attention for preserving it clean and well aired. One washing day in a week, in the winter season, or in bad weather, will be found sufficient, and then every moveable article should be taken upon deck ; the beams, carlines, &c. should be washed with vinegar ; and after the whole is finished, stoves should be lighted, and moved to the different parts of the ship, in order to air and dry it completely, before the people are suffered to go below.

On other days, after breakfast, one man from each mess should get a wet swab, and sweep out and swab his birth, with the part opposite to it. The principal object requisite for the preservation of cleanliness is, to have the decks as free of lumber as possible. Each mess to be allowed a certain number of chests, and the deficiency of room to keep the people's clothes in to be made

up by bags, which should be numbered with that of their hammocks, and the same attention paid in having them scrubbed and brought up on the booms as to the hammocks. The ship's company should fix themselves in messes of not more than six, or less than four, the eldest man in each mess to have the charge, care and authority of it; and to be responsible for its being clean, quiet, and regular; and to report the misconduct of any person belonging to it. If any complaint be made of the victuals or respecting any thing which concerns the mess, it should come by him and him only. A free circulation of air, is the most essential requisite for the preservation of salubrity below. In harbours and at sea the wind-sails should be constantly sent down and trimmed, the ventilators should be at work, and the hammocks never kept below, if it be possible to preserve them from wet upon deck.

In wet weather, or on washing days, the people should not be allowed to carry their wet clothes below; dry tubs should be provided, and placed under the sentinel's charge, at the cabin door, to put them in, till the weather will permit them to be dried, nothing being more prejudicial to health than the humid vapours which they occasion when below. Battens should be nailed down to keep the chests in their limits, and to prevent them from rolling, on board frigates and sloops of war.

Every captain commanding a ship of war, who feels a just pride in his situation, will consider the health of the people under him, as the most material charge intrusted to his care and discernment. He is the guardian of their lives, their happiness, and their comfort. On him depends the success of enterprise. Evincing in all that he is concerned in, a parental feeling for those whom he commands, he is obeyed with cheerfulness. His seamen become fearless of danger; they dread nought but the anger of their commander. All who are under him are satisfied; and that astisfaction brightens into active zeal, when occasion calls it forth.

INSTRUCTIONS FOR AN OFFICER IN HIS WATCH.

As soon as an officer relieves the deck, he should examine the ship's courses, see that the sails are properly trimmed forward and aft, and the backstays well up; that the people stationed to look out are relieved; that the watch are all up, and the ship in her station, which he should carefully preserve, and insert the bearings of the Commodore's light on the log-board every hour. A carefull midshipman should be sent to visit the lower decks every half hour. When the wind blows hard if the ship be at anchor, send the mate of the watch down every hour, to see that the cable does not chafe against the manger-board or in the hawser, and that the stoppers hold. When it blows hard at sea, have hands stationed at the relieving tackle. Let the gunner's mate report the security of the guns every hour, and the carpenter's mate the quantity of water in the well. Proper people should be stationed to stand by the haulyards and sheets, and the clew garnets, clewlines, down haul, &c. should always be stretched along.

PART IV.

NAVAL TACTICS,

OR

THE MILITARY OPERATIONS OF FLEETS.

DEFINITION.

NAVAL TACTICS is the art of ranging fleets in such order or disposition as may be judged most convenient, either for attacking, defending, or retreating, to the greatest advantage ; and to regulate their several movements accordingly. It is not a science established on principles absolutely invariable, but founded on such reasons as the alteration and improvement of arms must necessarily occasion in a course of time and experience ; from which, also, will naturally result a difference in the construction of ships, in the manner of working them, and, in fine, in the total disposition and regulation of fleets and squadrons. We shall cursorily run through this succession, and change of arms, &c. to the present improvement of our lines of battle, in order to make us the more sensible of the reasons which have induced the moderns to prefer so advantageous a choice as they now follow in the arrangement of their ships.

The invention of gunpowder, in 1330, gradually introduced the use of fire-arms into naval war, without finally superseding the ancient method of engagement. The Spaniards were armed with cannon in a sea-fight against the English and the people of Poitou, abreast of Rochelle, in 1372 ; and this battle is the first wherein mention is made of artillery in our navies. Many years elapsed before the marine armaments were sufficiently provided with fire-arms. So great a revolution in the manner of fighting, and which necessarily introduced a total change in the construction of ships, could not be suddenly effected. In short, the squadrons of men-of-war are no longer formed of rowing vessels, or composed of galleys and ships of the line ; but entirely of the latter, which engage under sail, and discharge the whole force of their artillery

from their sides. Accordingly, they are now disposed in no other form than that of a right-line, parallel to the enemy, every ship keeping close-hauled upon a wind on the same tack. Indeed the difference between the force and manner of fighting ships and galleys, rendered their service in the same line incompatible. When we consider, therefore, the change introduced, both in the construction and working of the ships, occasioned by the use of cannon, it necessarily follows, that squadrons of men-of-war must appear in the order that is now generally adopted.

The machines which owe their rise to the invention of gunpowder, have now totally supplanted the others; so that there is scarce any but the sword remaining of all the weapons used by the ancients. Our naval battles are, therefore, almost always decided by fire-arms, of which there are several kinds, known by the general name of *artillery*. In a ship of war, fire-arms are distinguished into cannon mounted on carriages, swivel cannon, grenades, and musketry. Besides these machines, there are several others used in merchant ships and privateers, as cohorns, carabines, fire-arrows, organs, stink-pots, &c.

The writers on naval tactics have been but few indeed, considering the importance of the subject; and the only countries that have produced writers on this subject, so far as we know, are France and Britain, particularly the first.

In the prosecution of this work, we shall occasionally consult *An Essay on Naval Tactics*, &c. by John Clerk, Esq.; *L'Art des Armées Navales, ou Traité des Evolutions Navales*, par Paul L'Hoste; *Tactique Navale ou Traité des Evolutions et des Signaux*, par M. le Viscompte de Morognes, &c. &c.

PART I.

THE PRESENT SYSTEM OF NAVAL TACTICS.

CHAPTER I.

OF THE ORDERS OF SAILING.

Division of a Fleet into three Squadrons, the Van, Centre, and Rear.

A Fleet of ships of war is usually divided into three divisions or squadrons, called the *centre*, *van*, and *rear*; and each squadron has a commanding officer, distinguished by different coloured flags—as, centre, *red*; van, *white*; and rear, *blue*. The comman-

der-in-chief, is in the centre column ; the next in rank, has the command of the van, weather, or starboard division ; and the junior, that of the rear, lee, or larboard division, depending, however, on the pleasure of the commander-in-chief, who may alter according to circumstances. The ships of each squadron are distinguished by the position of their colours. The ships of the first, or centre squadron, carry their pendants at the main-top-gallant-mast head, and the ships of the second division carry their pendants at the fore-topgallant-mast head, and those of the third division at the mizen-topmast head.* Each squadron ought, if possible, to consist of the same number of ships ; and also to be of the same force, so that each may be equally able to attack or repulse the enemy ; and when in a line, the several parts will be equally strong. When the fleet is very numerous, each squadron is sometimes subdivided in a similar manner into three divisions of centre, van, and rear.

When the fleet is formed in the line or order of battle, each commander takes his post in the centre of his squadron, the commander-in-chief being in the middle of the line. If the enemy be not in sight, the store-ships, fire-ships, sloops, &c. are to be to the windward of the fleet, because they can be more easily supported, and can more readily obey the signals that may be made to them. There are frigates to the windward of the van and rear of the convoy, for the purpose of looking out for the enemy, and keeping those vessels in their proper stations. But if the enemy is in sight, then all those ships which are not to be in the line of battle, are to be on the other side of the line with respect to the enemy. If the fleet is sailing in three columns, the first or centre squadron is in the middle between the second and third squadrons ; one of which, according to circumstances, forms the starboard, and the other the larboard column, and each commander leads his respective division. If the fleet is destined for a certain place, at a considerable distance, it is generally formed into squadrons ; but if cruising in expectation of meeting the enemy, the commander-in-chief naturally keeps his ships in such sailing positions as may be most advantageous to form for action as quickly as possible. These various positions or arrangements are called *orders ;* and that they may be better understood, it is necessary to premise the following definitions :

The starboard line of bearing, is that line upon which the ships of a fleet, being ranged, bear from each other upon a close-hauled line, whatever course they may be steering ; and so that, upon

* There are three classes of commanders in the United States navy ; and agreeable to regulations of the Navy Department, they are designated by broad, red, blue, and white pendants, with stars. Every commander, whatever may be his class, is entitled to wear the broad blue pendant, when not in company with an officer senior to himself. Should he meet with such an officer, he then hoists the pendant of the class to which he belongs.

hauling their wind, or tacking together as may be necessary, the ships will be in line close-hauled upon the starboard tack.

The larboard line of bearing, is that line from which the ships of the fleet, by hauling their wind, or tacking together, may be formed in a line close-hauled on the larboard tack.

A fleet of ships is said to be in the *line a-breast* when the ships' keels are parallel to each other, and their main-masts in the same straight line.

The bow and quarter line, is when the ships are ranged in a straight line, cutting their keels obliquely in the same angle. Hence at any intermediate ship, the ships towards one extremity of the line will be on the bow, and those towards the other extremity will be on the quarter of that ship.

If several ships stand on the same line, and steer the same course, but different from that line, they are said to be in *echiquier* or *chequerwise*.

Manœuvre in succession, is when a fleet, ranged in one of the orders of sailing, and standing on the same line, the same manœuvre is successively performed by each ship as she arrives at the wake of the van ship of the whole fleet, if in one line; or of the van ship of her particular division when divided into squadrons. So that a fleet tacks or veers, bears away or comes to the wind in succession, when all the ships of every line execute, one after another, the same manœuvre on the same point of the wake of the leading ship.

The number of orders of sailing is commonly assumed to be five, and denominated the *first*, *second*, *third*, *fourth* and *fifth* orders of sailing; besides an order of *battle*, an order of *retreat*, &c.

In the first order of sailing, the fleet is ranged on one of the lines of bearing, and each ship steering the same course. Thus, in fig. 1. let the wind be north, and the fleet ranged on the starboard line of bearing, and let the ships steer any course, as south-west. In this case, the fleet is ready to form the line on the starboard tack by hauling the wind. Again, let the fleet be ranged on the larboard line of bearing, and steering the same course as before, as in fig. 2; then the fleet is in a position ready to form the line on the larboard tack, by tacking.

In a numerous fleet this method of sailing is defective, as the fleet will be too much extended, and therefore the communication between the van and the rear rendered more difficult than when in a more connected order. It is of use, however, when the enemy is in sight, as then the fleet may be readily formed in order of battle; and in that case only, or in passing through a strait, will it be necessary to range the fleet in this order.

On the second order of sailing, the fleet is ranged on a line perpendicular to the direction of the wind, and steering any proper course. This order, which is represented in fig. 3. has the same defects as the former; and has also this disadvantage attending it, that the fleet cannot safely tack in succession from this order, as

each ship, at the time of tacking, is in danger of falling on board the ship next astern ; and therefore, if the line is close, the ship astern must bear up considerably in order to avoid being on board the ship ahead, which, at that time, is in stays.

The third order of sailing, is that in which the whole fleet is close-hauled, ranged upon the two lines or lines of bearing, and therefore containing an angle of twelve points ; the commander-in-chief's ship being at the angular point, and the whole fleet steering the same course. Thus, in fig. 4. the wind being supposed north, and the fleet close-hauled on the starboard tack ; then A being the commander-in-chief's ship, one part of the fleet bears from him west-north-west, and the other part east-north-east.

This order of sailing is no doubt preferable to either of the former, as the ships are more collected, and can more distinctly perceive and obey the signals ; but if the fleet is numerous, it will be too much extended.

In the fourth order of sailing, the fleet is divided into six or more columns, as may be judged necessary ; by which means the fleet is much more connected than in any of the former orders. The commanders ranged upon the two lines of bearing, have their squadrons astern of them upon two lines parallel to the direction of the wind ; the first ships of each column being with respect to the commander of their squadron, the one on his starboard and the other on his larboard quarter. The distance between the columns should, however, be such that the fleet may readily reduce itself to the third order of sailing, and from that to the order of battle. This order is adapted for fleets or convoys crossing the ocean, and is represented in fig. 5. But, as it requires much time to reduce a fleet from this order to that of battle, it is therefore defective when in presence of an enemy.

The fifth and last order of sailing, is that in which the fleet is divided into three columns close hauled, and therefore parallel to each other ; and also the respective ships abreast of each other. The van commonly forms the weather column ; the centre division, the middle column ; and the rear division, the lee column. Circumstances may, however, require the van to be the lee column, and the rear the weather column. If the fleet is very numerous, each division may be divided into two columns ; and each commander is to place himself at a little distance before, and in the direction of the middle of his division. Fig. 6. and 7. represent this order of sailing.

The distance between any ship and that adjacent to it in the same column, and also the interval between the columns, are regulated by the commander-in-chief according to circumstances. The interval or perpendicular distance between the columns, is commonly taken ; such as, that the angle contained between the line of the columns and an imaginary line joining one of the extreme ships of that column, and the ship at the other extremity

of the adjacent column, may be about two points. The measure of this angle must, however, depend in part upon the length of the column ; and when it is determined upon, the distance between the columns may be found by multiplying the length of one of the columns by the tangent of the above angle to the radius unity : whence, if that angle be taken equal to two points, the length of a column multiplied by the decimal .414 will give the distance between the columns. Thus let a column contain six ships ; let the distance between each be 100 fathoms ; and the length of each ship from the extremity of the bowsprit to the stern 46 fathoms ; then the whole length of the column will be 776 fathoms. Now, the above angle being taken equal to two points, the distance between the columns is equal to $776 \times .414 = 321\frac{1}{4}$ fathoms.

The order of battle is formed by drawing up the ships of the fleet in a line nearly close-hauled, and under an easy sail ; each ship being at a certain assigned distance from that next a-head, as a half or a whole cable's length. The fire-ships, with frigates a-head and a-stern, form a line parallel to the former, and to the windward of it if the enemy is to the leeward ; but to the leeward if the enemy is to the windward. Without this line another is formed, parallel thereto, of the store-ships, &c. with frigates a-head and a-stern. Fig. 8. represents the order of battle, the fleet being on the starboard tack.

In retreating from a superior force, it is necessary to draw up the fleet in such an order that it may, with the greatest advantage, oppose or annoy the fast-sailing vessels of the enemy : for this purpose, the order of retreat, commonly taken, is that which is the inverse of the third order of sailing. As the fleet generally runs before the wind, the ships of the line are, therefore, ranged on the low lines of bearing ; hence these lines contain an angle equal to 135 degrees. The commander-in-chief is at the angular point, and the frigates, transports, &c. are included within the wings to leeward. In place of running before the wind, the fleet may take any other proper direction ; but still the angle contained by the wings is to be 135°. This order of retreat is represented in fig. 9.

The order of convoy, is that in which the ships are all in the wake of one another, steering on the same point of the compass, and forming a right-line. If the fleet is numerous, it may be divided into three columns, which are to be ranged parallel to each other, that of the commander-in-chief occupying the middle, and all steering the same course.

Having defined the different orders of sailing, we shall now proceed to show the method of getting a fleet under-way, and of bringing it to an anchor.

In order to get a fleet under-way, the lee column is to get under-way first, and bring-to all at the same time, just as they find themselves after casting. The centre column is then to perform

the same manœuvre, and cast likewise, as soon as the other column is brought-to ; and both columns will remain in that position till the weather column, which is still a-peak, having weighed, shall be also under-way. The three columns may often be got under-way all at once : but, to execute this, the fleet must all act together, and with equal ardour ; for the weather ships must not, at any rate, be under-way before the lee ones. If it be necessary to get immediately in order of battle, the weather columns are at once to bear-away two points together, that they may take their posts in the line of battle a-head of the lee column.

Orders of Sailing.

If the fleet be moored in a line, head to wind, the rear ship may get under-way first, and haul immediately by the wind ; the others in succession, from the rear to the van, can easily take their station in her wake, so that the rear ship will now become the leader. Or, the fleet may all get under-way at the same time ; but the van ship is to bring-to, while the rest, casting the other way, would stand on by the wind on the same tack on which they have cast, and come to tack successively in her wake, to form the order of battle.

To bring a Fleet to an Anchor.

To bring a fleet to an anchor, it ought, if considerable, to anchor in three parallel lines, on one of the lines of bearing, and at the proper distance which the length of the columns require ; the distance between the adjacent ships, in the same column, being about a cable's length. The van and rear of the columns are to correspond with each other exactly in the direction of the wind, that they may with ease get under-way, and form the order of battle with facility, so as to be able to dispute the weather-gage with the enemy if he should come in sight. As this evolution is to be performed in moderate weather, the fleet being in three columns, they are all at the same time to bring their ships head to the wind under their topsails, and let go their anchors together, clewing up their topsails with all possible despatch ; putting the foot of the sails in the tops, and loosening the sheets before hauling them down ; then veering away an equal quantity of cable to preserve the assigned distance. When it blows so fresh as to require the topsails being reefed, two cable's length may be kept between the ships, and even three if it be likely to blow hard.

If the fleet does not exceed 20 ships, they may anchor on one of the lines of bearing, or parallel to the coast, in places where trade-winds are common, provided they blow in the direction of the land ; for, in all cases, they must be in a condition to get under-way at the first sight of the enemy, whose approach is never

to be waited for at anchor ; because, if it be dangerous for a single ship, it must be still more so for a fleet, the movements of which are interrupted by the difficulty there is in getting with celerity under-way ships which are moored, and which, in that case, are not able mutually to support one another, as is absolutely requisite in a fleet.

CHAPTER II.

THE MANNER OF FORMING THE SEVERAL ORDERS OF SAILING.

To Form the First Order of Sailing.

The first order of sailing is formed as follows :—As the fleet is supposed to be in no particular order, that ship which is to lead on the proposed line of bearing, on which the fleet is to sail, runs to the leeward of the whole or greater part of the fleet, and then hauls her wind, carrying an easy sail: each ship then endeavours to get into her proper station, by chasing the ship which is to be next a-head of her ; and when in the wake of the leader, must take care to preserve the assigned distance from the ship immediately a-head, by increasing or diminishing the quantity of sail ; and if any of the fleet should happen to be so far removed from her second a-head as not to be able to chase her without getting out of her way towards the line ; in that case she must take her station discretionally in a line with the leaders, and leave a proper interval. The fleet will now be formed in the line of battle, from which the first order of sailing is formed by each ship bearing away at the same instant, and steering each the same proposed course.

To Form the Second Order of Sailing.

To form the second order of sailing, the commander-in-chief runs to the leeward of the whole, or of so many of the fleet as that each ship may easily fetch his wake, and then steers a course eight points from the wind, carrying an easy sail. Each ship now gets into her proper station, by chasing that which is to be a-head of her ; and when the whole fleet is formed in a line, which will be perpendicular to the direction of the wind, each ship bears away at the same instant, and the whole steer the same intended course.

To Form the Third Order of Sailing.

In the third order of sailing, the commander-in-chief is in the middle of his fleet. Now, the fleet being formed in a line on one of the lines of bearing as above directed, and the ships steering in the wakes of each other, or ten points from the wind, the leading or leewardmost ship first hauls her wind; the second ship, as soon as she is in the wake of the leader, hauls her wind also; and in like manner each ship, until the commanders successively haul their wind as soon as they have reached the wake of the leading ship; and, at the same instant that the commander-in-chief's ship hauls her wind, the others, or sternmost half of the fleet, do the same. The fleet will then be in the third order of sailing, as represented in fig. 4. From this order of sailing, the fleet can be expediously formed into the line of battle on either tack.

To Form the Fourth Order of Sailing.

As the fleet, in the fourth order of sailing, is divided into six columns, and the three commanders ranged on the two lines of bearings, the commander-in-chief being at the angular point; in order, therefore, to form this order, the commanders range themselves on the two lines of bearing, at a proper distance from each other, and steer the proper course; the ships of the several columns come each into its respective place, forming themselves into lines in the direction of the wind, and parallel to each other, as in fig. 5.

To Form the Fifth Order of Sailing.

In order to form the fifth order of sailing, the three leading ships of the divisions are to take their posts abreast, and to leeward of each other, keeping their wind under an easy sail. Then the ships of each squadron, making sail, will range themselves in their respective stations, astern of their leaders, and keeping the same course; each ship preserving the appointed distance from that next a-head; and the commanders of each division, and each second, third, &c. ship, are to keep themselves mutually abreast of each other.

To Form the Order of Battle.

To form the order of battle, it has already been observed, in the first order of sailing, that the ship which is to lead runs to the leeward of the whole, and then hauls her wind upon the tack directed, carrying an easy sail. Each ship then makes sail according to her distance, and chases the ship which is to be immediately

a-head of her in the line, and hauls in her wake in the line on which the van ship is moving.

To Form the Order of Retreat.

The commander-in-chief, or ship appointed to make the angular point, runs to the leeward of the fleet, and brings to; then each ship runs to its respective station in one of the lines of bearing, and brings to; one half of the fleet being on one of the lines of bearing astern, and in the wake of the commander-in-chief, and the other half on the other line of bearing on the starboard or larboard bow of the commander-in-chief. When this is accomplished, the whole fleet bears away before the wind; the two wings will now bear from the commander-in-chief two points before his beam, and ready to form the line of battle upon either tack; the ships on the commander's starboard bow being in the line of bearing for the larboard tack, and those on his larboard bow in the line of bearing for the starboard tack.

CHAPTER III.

TO CHANGE FROM THE SEVERAL ORDERS OF SAILING TO THE LINE OF BATTLE.

To Form the Line from the first order of sailing.

If the ships be running large on the tack answering to the line of bearing on which they are sailing and the line to be formed on the same tack, all the ships haul the wind at the same time, or at least each ship hauls her wind immediately after the next to windward; but if the fleet be on the other tack with respect to the line of bearing, all the ships haul their wind and tack together, or all veer together according to circumstances. If the line of battle is to be formed on the other line of bearing, the leewardmost ship either veers or tacks, and hauls her wind: the rest of the fleet veer or tack at the same time, and steer with the wind four points free; and each ship successively, as soon as she gets into the wake of the leader, hauls her wind. Hence the line of battle will be formed from the first order of sailing. See figs. 10. and 11.

To Form the Line from the second order of sailing.

To form the line from the second order of sailing, the fleet

running large or before the wind, all the ships of the fleet haul up together on the tack directed, presenting their heads on the line upon which they are ranged, or eight points from the wind. The leading ship then hauls her wind, and is followed in succession by the rest. That the ships may not be too near each other, they make sail as they haul their wind, or their seconds astern shorten sail to open the order. See fig. 12.

From the third order of sailing.

To change from the third order of sailing to the line of battle: the ships being supposed going large, that wing which is in the line of bearing for the tack on which the line is to be formed, and the ship at the angular point, haul their wind at the same time, the ships of the other wing haul up together eight points from the wind, then each ship moves in this direction until she reaches the wake of the other wing, where she hauls close up. See fig. 13.

From the fifth order of sailing.

To form the line of battle on the same tack from the fifth order of sailing: let the weather column form the van, and the lee column the rear. The centre brings to, or only keeps steerage-way; the weather column bears away two points, and hauls its wind as soon as it is a-head of the centre; the lee-column tacks together, and runs under a press of sail, to gain the wake of the centre, when it re-tacks together and completes the line, (see fig. 14.) This evolution may also be performed as follows: the weather column brings to; the centre and lee columns tack together, and go away two points free; when the centre column has gained the wake of the van, it re-tacks together, and brings to; and when the lee column has gained the rear line, it re-tacks together, and then all stand on: otherwise the lee column brings to; the centre goes under an easy sail two points free, to get a-head of the rear squadron; while the van carries a press of sail, also two points free, to get a-head of the centre division.

Hitherto the weather column has uniformly been supposed to form the van, and the lee column the rear division: the line may, however, be formed by interchanging these columns in a variety of different ways, some of which are as follows:

1. *The centre and weather columns Interchange.*

Let the weather and centre columns interchange: in this case the centre column stands on, the weather column bears away eight points, and as soon as it reaches the wake of the centre column, which now forms the van, hauls up together: the lee column tacks together, and goes under a press of sail scarcely two points

free, so as just to gain the rear of the lines and then re-tacks together, as in fig. 15. This evolution may also be performed by the lee column bringing to; the centre squadron then bears away together one point, and as soon as it has gained the head of the line, hauls its wind; and the weather column bears away together three points, under an easy sail; and when it has got into the wake of the van, hauls up together, forming the centre division.

2. *The centre and lee columns Interchange.*

Let the centre and lee columns interchange: the lee column stands on close hauled, under an easy sail; the weather column bears away two points under a press of sail, until it reaches the head of the line, and then hauls up; the centre column bears away eight points, and when in the wake of the lee column, which is now the centre division, hauls its wind. See fig. 16.

3. *To Change from the orders of sailing to the Line of Battle.*

The weather and lee columns interchanging: for this purpose, the lee column stands on close hauled, under a press of sail; the centre column bears away two points, under an easy sail, and hauls up as soon as it has come into the wake of the new van squadron; and the weather column bears away eight points, until it gains the wake of the centre column, and then hauls up, as in fig. 17.

4. *The Centre forming the Van, and the Weather the Rear.*

The centre forming the van and the weather the rear division: the lee column brings to, and the centre column bears away together two points, and forms the line a-head of the new centre squadron; the weather column veers away together seven points on the other tack, and forms the rear squadron. See fig. 18.

5. *The Lee column forming the Van, and the Centre the Rear division.*

The lee column to form the van and the centre the rear division: in order to this, the lee column stands on under a press of sail; the weather column bears away together three points, under an easy sail; and the centre column bears away eight points; and each, when it has gained the wake of the new van, hauls its wind. See fig. 19.

To Form the Line on the weather tack, the weather column forming the van, &c.

To form the line of battle on the other tack from the fifth order of sailing: the weather column first tacks in succession; the centre and the lee columns stand on, the first under an easy sail, and the second under still less sail, according to the length of the columns; and the leaders tack when they gain the wake of the new-formed van, and each ship tacks in succession as it reaches the wake of the above-mentioned van, (see fig. 20.) Very great care must be taken by the centre and lee columns, lest they draw too near the sternmost ships of the van, and also each other.

The Centre and Weather columns Interchanging.

To perform this evolution, the centre and weather columns interchanging: the weather column brings to, the centre column stands on until the leader judges he will be fully able to clear the weather column, and then the centre column tacks in succession: when the last ship of this new-formed van has passed the weather column, that column stands on, and each tacks in succession as soon as it reaches the wake of the van. The lee column stands on, and tacks in succession as the ships attain the wake of the van, and at the same time carrying a moderate sail, that there may be a sufficient interval left for the weather column to form the centre division. See fig. 21.

The Centre and Lee columns Interchanging.

To form the line from the fifth order of sailing on the other tack, the centre and lee columns interchanging. The centre column brings to, the weather column tacks in succession under very little sail, and the lee column stands on under a press of sail: when the leader of the lee column has gained the wake of the line, he tacks, and is followed in succession by his division. The centre column is to fill and stand on, when the first ship of that column, and the last ship of the lee column, bear from each other in a line perpendicular to the direction of the wind. See fig. 22.

The Weather and Lee columns Interchanging.

To form the line on the other tack from the fifth order of sailing, the weather and lee columns interchanging. The weather and centre columns bring to; the lee column stands on under a press of sail, until it can pass a-head of the weather column, and then tacks in succession; the centre column fills where its leading ship and the last ship of the lee column bear from each other, in a line perpendicular to the direction of the wind, and tacks in succession when it has gained the wake of the new van. In like

manner, the weather column fills when its leading ship and the last of the centre bear in a line perpendicular to the wind, and each ship tacks in succession, when it has gained the wake of the centre. See fig. 23.

The Weather column passing to the Rear.

To form the line on the other tack, the centre forming the van, and the weather the rear division. The weather column brings to, the other columns make sail and stand on, till they can pass on the other tack, a-head of the weather column, when they tack in succession. When both columns have passed the weather column, it fills, tacks in succession, and forms the rear. See fig. 24.

The Lee column passing to the Van.

To form the line on the other tack from the fifth order of sailing, the lee column forming the van. The weather and centre columns bring to; the lee column carries a press of sail, and tacks in succession when it can pass a-head of the weather column; and when the last ship of this new van has passed to the windward of the former weather column, the van squadron shortens sail, to give time for the other columns to form; the weather and centre columns fill at the same time, to gain the wake of the van, when they tack in succession. See fig. 25.

To form the Line from the order of Retreat.

To form the line from the order of retreat. The leader of the wing, which is to form the head of the line, hauls the wind, and that wing follows in succession; the other wing goes four points free together on the same tack, and thus runs parallel to the wing which first began the evolution; and they haul up together when they arrive in the wake of the line. See fig. 26.

CHAPTER IV.

TO CHANGE FROM THE LINE OF BATTLE TO THE DIFFERENT ORDERS OF SAILING.

To change from the Line of Battle to the first order of Sailing.

To change from the line of battle to the first order of sailing on the same tack. All the ships bear away together the number

of points directed by the commander-in-chief, observing to keep themselves in the line of bearing for the tack they are in. The sternmost ship bears away first, and the rest successively as quickly as possible, to prevent being too near each other.

To change to the first order of sailing, in bearing for the line, on the other tack. The leader bears away four points to leeward, and is followed in succession by the rest. When the sternmost ship has bore away, the whole haul up, and they will be in bearing for the line on the other tack. See fig. 27.

To change to the second order of Sailing.

To change from the line of battle to the second order of sailing. The whole fleet bears away together ten points ; and so proportions the sailing from the van to the rear of the line, that when the headmost ship, which first presses sail, shall come abreast of the second ship, the second ship adapts her sail to keep in this bearing, and so on in succession, each observing to keep the ship that immediately preceded her in the evolution in a line with herself, perpendicular to the direction of the wind ; and the whole fleet will now be running before the wind, (see fig. 28.) But if it is intended that the fleet shall steer any other given course than that before the wind, the whole fleet may then alter together to the proposed course.

To change to the third order of Sailing.

To change to the third order of sailing from the line of battle. The whole fleet bears away together ten points, the headmost half of the fleet, including the centre ship, carry an equal degree of sail, in order to preserve their line of bearing ; each ship of the remainder of the fleet carries less sail in succession, such as will form and preserve on the other line of bearing with respect to that upon which they were ranged before the evolution ; and by this means the fleet will be formed in the third order of sailing. See fig. 29.

To change to the fifth order of Sailing on the same tack.

To change from the line of battle to the fifth order of sailing on the same tack. In the treatise of *Naval Tactics*, published in the second volume of *The Elements of Rigging and Seamanship*, there are various rules for performing this evolution, according as the different squadrons in the line of battle are intended to form the weather, the centre, and the lee columns in the order of sailing. We shall give two of these as examples.

1. *To change from the Line of Battle to the orders of Sailing.*

When it is intended to change from the line of battle to this order of sailing, so as that the van shall form the weather and the rear the lee column, and the fleet at the same time keep as much to windward as possible ; the van and centre tack together, and run close hauled in bow and quarter-line ; the rear moves on its former course under an easy sail. When each ship of the centre is abreast of its correspondent ship in the rear, the centre retacks ; the van stands on until the centre and rear come up, and then retacks, and all the columns regulate their distances. See fig. 30.

2. *The Van forming the Lee and the Rear the Weather column.*

When it is intended that the van shall form the lee and the rear the weather column, the van bears away together under an easy sail, and goes at right angles with the line a-head : the centre at the same time goes away two points free, and each ship steers for that ship of the van respectively which is to be abreast of her when in column. The leader of the van must determine the distance, by not hauling up with his division until his ship and the sternmost ship of the centre column, which is drawn up with him, are in a line at right angles with the wind : they then both stand on under an easy sail, while the rear crowding sail passes to the windward of both. See fig. 31.

To change to the fifth order of Sailing from the Line of Battle on the other Tack.

To change from the line of battle to the fifth order of sailing on the other tack. This evolution may be performed in as many ways as the former, according to the intended positions of the different columns ; but, in such a work as ours, it may be sufficient to observe, that,

1. *When the Van is meant to form the Weather and the Rear the Lee column :*

The van tacks in succession ; the leader of the centre tacks when the leader of the van is passing him exactly to windward, and his division follows him ; the rear manœuvres in the same manner with respect to the centre. See fig. 32.

2. *The Rear forming the Weather and the Van the Lee column.*

When the rear is to form the weather and the van the lee column, the van tacks in succession ; and when about, either brings

to or shortens sail, to allow the other columns time to form. The centre and rear then carry sail, and tack in succession. The centre tacks when its leader has the centre of the lee column in a line at right angles with the wind, or when its centre passes astern of the lee column. When the centre is about, it regulates its rate of sailing by the lee column, either by bringing to or making equal sail ; and thus both wait for the rear to pass to windward. The rear tacks when its leader has the first ship of the lee column in a line at right angles with the wind, or when its centre ship passes astern of the last ship of the centre column. See fig. 33.

To change to the order of Retreat.

To change from the line of battle to the order of retreat : the leader bears away four points ; and all the fleet following close hauled, they will come to and file off in succession at the same point in the van ship's wake, till the centre ship arrives at the angle where the evolution began. Then the order of retreat will be formed, and any course whatever may be steered, since the two wings will be equal and in order on the starboard and larboard lines of bearing, forming consequently between them an angle of 135 degrees. Fig. 34. represents the order of retreat formed from the line of battle, the whole fleet going four points free.

CHAPTER V.

TO MANŒUVRE THE LINE OF BATTLE.

The method of forming the line of battle, when the ships are in no previous order, has already been explained. In this place it is intended to point out some of the various evolutions that are, or may be, performed by a fleet which is already formed in line of battle.

To form the Line on the other tack by tacking in succession.

The fleet being in line of battle, to form the line on the other tack by tacking in succession : the headmost ship of the fleet tacks first, having previously made more sail, or the second having shortened sail, in order to increase the interval between them ; for it often happens that one or two cables' length are run over before the ship a-head has been able to fill her sails on the other tack. When the first ship is about, either the second makes more sail, or the third shortens sail ; and then the second tacks as soon

as she has gained the wake of the leader, the helm being put down at the instant she opens the weather quarter of the first ship which is already on the other tack. In like manner the third, fourth, &c. ships tack each at the instant it has gained the wake of the leader, and those ships already about must preserve their assigned distances, by shortening sail, if necessary, until the whole fleet is on the other tack. If a ship misses stays, she is immediately to fill again on the same tack, and make sail with all possible expedition, taking care to keep as close as possible to the wind, and not to fall off to leeward. By this means she will get a-head and to windward of those which follow her; and they will perform successively their evolutions in the wake of the ships which are already on the other tack, only standing on a little farther than they would have done if the ship a-head had not missed stays. The ship that missed stays will return sooner to her station, by making all possible sail, to windward of the line. See fig. 35.

Without tacking in succession.

To form the line on the other tack without tacking in succession: the whole fleet veers together; the rear ship hauls her wind on the other tack, and stands on, while all the others go two points free on the other tack, and haul up as they successively gain the wake of the leading ship. Thus the rear of the line on the one tack becomes the van on the other tack. See fig. 36.

To Veer in succession.

The line to veer in succession: the van ship of the line veers round, and steers four points free on the other tack; and when she is clear of the rear ship of the line, she hauls her wind; the rest follow, and haul up in succession. See fig. 37.

To Tack and Retack.

The line to tack and retack together. In tacking together, the sternmost ship of the line puts in stays; then her second a-head puts her helm down, and so on through the whole line, to prevent the ship a-head from falling on board the ships astern. The fleet will then be in bow and quarter line; from which, if tacking together, no ship must put in stays till the ship on her weather quarter is in the act of tacking.

To Bear-away together.

The line bear-away together, preserving their bearing for the line. The rear begins this evolution, the sternmost ship bearing away the number of points proposed, and so on as quickly as possible, to prevent falling on board of each other.

To turn to Windward.

To turn to windward in line of battle : when the fleet has sea-room, the most advantageous method of gaining to windward is, that all the ships of the fleet may go about together ; as by this means the whole fleet will gain as much to windward as in the case of a single ship. The fleet will be in line of battle on the one board, and in bow and quarter line on the other. This is also the most proper method to get to windward on a coast when the wind is parallel to the land : but if the fleet is turning to windward in a strait, or between two shores, the fleet should tack in succession ; for if all the ships tacked together, the van would be soon in with the land on one side, and soon after the fleet had retacked the rear would be in with the land on the other side : hence this would occasion a number of short boards. In passing through a strait, other circumstances are also to be attended to, as tides, &c.

To interchange the Van and Centre squadrons.

To interchange the van and centre squadrons : the van bears away a little, and brings to ; the centre passes on to windward, edging a little, to get ahead of the former van on the same line ; the rear, coming on under easy sail, edges away likewise, to obtain the wake of the new centre squadron. See fig. 38.

Van and Rear squadrons.

To interchange the van and rear squadrons : the van and centre squadrons bear away a little and then bring to, the van observing to bear away a little more to the leeward than the centre. The rear stands on to gain the head of the line ; and when abreast of the former van, the centre fills, and both standing on, form ahead of the new rear, by edging down until they are in a line with it. See fig. 39.

Centre and Rear squadrons.

To interchange the centre and rear squadrons : the van stands on under an easy sail, while the centre bears away a little and brings to, and the rear at the same time carries a press of sail to pass the centre to windward and get into the wake of the van. The van and centre then edge away to gain the line with the new squadron, which then fills. See fig. 40.

The Van to pass to the Rear.

The van to pass and form the rear : the van squadron edges away a little and brings to ; the other two squadrons, crowding sail, stand on till they get ahead of the new rear, and then edge away a little to form in the line : after which the rear fills.

The Rear to pass to the Van.

The rear to pass and form the van : the van and centre bear away a little and bring to ; the rear makes sail, passes ahead of both, and then edges away to form on the same line. These two manœuvres are so simple as not to stand in need of illustration by figures.

CHAPTER VI.

TO MANŒUVRE A FLEET IN THE FIFTH ORDER OF SAILING.

To Manœuvre the Fifth Order of sailing.

This order of sailing is very advantageous for a numerous fleet, as it keeps the ships closer together, and therefore more connected with each other than either of the first three orders. The method of forming this order is shown in Chap. II.—and the method of manœuvring in it, which, with very little alteration, is also applicable to the fourth order, is to be the subject of this chapter.

To Tack in succession.

To tack the columns in succession : the ships of the lee column having more distance to run before they can recover their position, must go about first in succession. When the centre leader finds himself abreast of the leader to leeward of him, or at right angles with the close-hauled line on the other tack, upon which the lee leader is now moving, he tacks, and is followed in succession by his division. The weather column paying the same regard to the centre column, manœuvres in the same manner, (see fig. 41.) In this evolution the weather column still continues to windward ; and should the columns have closed too much, or be too far asunder, either of which may happen from the inequality in the rate of sailing of the different ships, the order may be recovered either by the lee or windward column bearing away, so as to make an angle equal to that proposed, as two points, between any column, and a line joining the leader of that column and the sternmost ship of the next column.

If this evolution is to be performed in the night, the weather column must first tack. In order to prevent the risk of one column passing through the van of the other columns, the next column must not tack till its leader is sensible that many ships of the column immediately to windward are about. When about, the

leaders make little sail, while their followers make, successively, a little more, in order to form their respective columns. The columns which are completely about, should either bring to and wait for the next, or should just keep steerage-way ; thus the former weather column should wait for the centre, and both should then wait for the former lee column. In this evolution the weather and lee columns will be interchanged. As some risk may attend the execution of this at night, it is most adviseable to tack the columns together, and sail in bow and quarter line ; because, should it become necessary to retack, or should the wind change before the completion of this evolution, much confusion might ensue. By tacking together, this will be avoided.

To Tack together.

To tack the columns together : the sternmost ships of the three columns put in stays together, and when they are observed to be so, their seconds ahead immediately put their helm down, and so on through the whole fleet. Each column will then be in bow and quarter line. See fig. 42.

To Veer in succession.

To veer the columns in succession : the leader of the lee column veers round, and steers four points free upon the other tack, followed by the ships of that division ; and of which, when he is clear of the sternmost ships, he hauls up. The centre and weather columns perform successively the same evolution, observing to continue standing on till they successively bring the point at which the lee column began to veer to bear in a right line to leeward of them. They likewise successively spring their luffs when the point at which the lee column hauled its wind bears right to leeward, (fig. 43.) Each column having the same distance to run, if the evolution be well executed, the leaders of the windward columns will find themselves, when they spring their luffs, exactly abreast of the leader of the lee column, and so will all the other ships. But the making or shortening sail will, at all events, rectify the inequality of sailing.

To turn to Windward.

To turn to windward in the fifth order of sailing : let the ships of the fleet be so arranged that the leaders, and also the corresponding ships of the columns, may be in the direction of the wind ; as by this means the fleet will gain more to windward, and at the same time be less liable to disorder. Now the van ships of the columns tack at the same instant, and are followed in succession each by the remaining ships of the division, when they reach the wake of their leaders, or the same point when they went

about ; hence there will always be three ships in stays at the same time, until the whole fleet has got on the other tack. The fleet then stands on any assigned distance, and then retacks in the same manner as before. See fig. 44.

1. *To Interchange the Weather and Centre columns.*

To interchange the weather and centre columns : the weather and lee columns lie to, or only keep steerage way. The centre column tacks together, and forming a bow and quarter line, goes close-hauled to gain the wake of the weather column ; it then retacks together, and stands on, while the weather column bears away to its new station in the centre, and the lee column fills.—See fig. 45.

The Weather and Lee columns.

To interchange the weather and lee columns : the centre column brings to ; the lee column stands on under a press of sail ; and when its sternmost ship can pass to windward of the van of the centre column, which will be when the centre ship of the lee column is in a line perpendicular to the direction of the wind with the van of the centre column, the lee column then tacks together, and stands on close-hauled till it comes in a line with the centre column, when it goes large two points to get into the station which the weather column left ; and then veers together, hauling the wind for the other tack. At the beginning of the evolution, the weather column bears away together under little sail, and goes large six points on the other tack, so as to get into the wake of the centre column ; it then hauls to the former tack, going two points large, till it ranges abreast of the centre column, when it brings to, and waits for the new weather column. See fig. 46.

The Centre and Lee columns.

To interchange the centre and lee columns : the centre and weather columns bring to, or keep steerage way, as is most convenient; the lee column tacks together, and presses sail to gain the wake of the centre column ; which, when they have effected, they retack together and stand on ; the centre column then edges away under an easy sail, steering, if it lay to, eight points from the wind, and if it kept steerage way only two points, until it comes into the station of the lee column, where it hauls to the wind ; while the weather column fills and stands on : and the order is re-established by shortening or making sail, according to circumstances.

The Weather column to pass to Leeward.

The weather column to pass to leeward : the weather column

stands on under very little sail, while the centre and lee columns tack together, and carry a press of sail till they reach the wake of the weather column, when they retack, and crowd sail till they come up with the weather-column ; and when they have gained the wake of the weather-column, it bears away two points, to gain its station to leeward, and then hauls to the wind or brings to till the new weather and centre column comes up. See fig. 47.

The Lee column to pass to Windward.

The lee column to pass to windward : The weather and centre columns bring to, while the lee column carries sail, and tacks in succession as soon as the leading ship can weather the headmost ship of the weather column ; and when arrived upon the line on which the weather column is formed, it retacks in succession, forms on the same line, and either brings to or stands on under very little sail. If it brings to, the other two columns bear away together two points, to put themselves abreast of the column now to windward ; but if the new weather column stood on under an easy sail, they may bear away only one point to gain their proper stations. See fig. 48.

Method of keeping a ship in its proper station by means of the Naval Square.

As it is of the utmost importance that each ship be in her respective station, both to preserve order, and that the various evolutions may be more readily performed, the officer of the watch will therefore be ever anxious to preserve the station of his ship. This he may do by his quadrant ; but the more ready method for this purpose is by means of the Naval Square, which is constructed as follows :

Its Construction.

Upon some convenient place at the middle of the quarter-deck, describe the square ABCD (fig. 49.) of which the sides AD and BC are parallel to the keel ; through the centre line G draw the line EF parallel to AD or BC, and draw the diagonals AC and BD; bisect the angles EGD, EGC by the straight lines GH, GI, and the naval square will be constructed. Now since the angles FGD, FGC, are equal to four points, being each half a right angle ; therefore, the angles EGD, EGC, are each equal to twelve points, and consequently the angles EGH, EGI, are each equal to six points. Hence, if a ship is running close-hauled on the starboard tack, in the direction FE, the direction of the wind will be IG, and her close-hauled course, on the other tack, will be GC : but if she be running in the same direction FE upon the larboard tack, her close-hauled course, on the starboard tack, will be in the direction GD.

And Application.

In order now to apply the naval square to the keeping of ships in their respective stations, let the fleet be formed in the fifth order of sailing close hauled, the corresponding ships of the columns coinciding with the direction of the wind, in order to turn to windward with greater facility. The corresponding ships in the column must be kept in the direction of GH, or GI, according to the direction of the wind and the tack they are upon, while all the ships of the same column must be in the direction of EF.—See fig. 50.

Again, let the fleet be in three columns in one of the lines of bearing, the ship being close-hauled on the other tack. The ships of each column will be in the direction of one of the diagonals, while the corresponding ships of the other columns will be in the direction of the other diagonal (fig. 51.) It will also be the same if the columns are in one line of bearing, and going four points large on the same tack. The application of the naval square in other cases will be obvious.

CHAPTER VII.

TO RESTORE OR REFORM THE ORDER OF BATTLE UPON SHIFTS OF THE WIND.

1. *To Restore the Order of Battle upon Shifts of the Wind upon the same tack, the wind coming forward less than Six Points.*

Let it be intended to restore the order of battle on the same tack, the wind coming forward, and shifting ahead less than six points. In this case, the whole fleet is to bring to except the leader; who, in order that the same distances between the ships may be preserved, when the line is re-formed, steers a course *a b* (fig. 52.) such as to be at right angles to the middle point between the former and present direction of the wind: hence the course he must steer will be known by adding half the number of points the wind has shifted to eight points, and applying this sum to the former close-hauled course. As soon as the leader has arrived at the new close-hauled line with respect to the second ship ahead, that ship immediately fills, and bears away the same number of points as the leader; and when both these have reached the close-hauled line with respect to the third ship, she also fills, and bears away. In like manner the remaining part of the fleet bear away

in succession; and when they have got into the close-hauled line *b c* with the sternmost ship, they all haul their wind at the same instant, and the sternmost ship fills and stands on close-hauled.

A very expeditious method of performing this evolution is as follows: the whole fleet having fallen off as soon as the wind shifted the same number of points which it changed, the leader bears away eight points from the middle point between the former and present directions of the wind; or, if the wind has shifted near six points, in this case the leader must bear away eight points from the new direction of the wind; but then the fleet will be closer than before, and the leader hauls his wind as soon as the sternmost ship bears on the close-hauled line from him: the second ship bears away when she has reached the wake of the leader, and also hauls her wind when she has again gained his wake. In like manner the third, fourth, &c. ships bear away, and also haul their wind in succession, until the sternmost and the whole line is formed again. See fig. 53.

Four Points.

If the wind shifts exactly four points ahead, the whole fleet is to veer round till the heads of all the ships are directed to the point exactly opposite to their former course; and the rear ship, which has now become the van, is to run four points large upon her new tack, and the rest of the fleet to follow her in succession; and when the last ship, which was the former leader, is got into the wake of the headmost in the line, the whole fleet is to veer together, and the order will be re-formed on the former tack.

Eight Points.

If the wind shifts eight points forward, the ships are to veer round altogether till their heads are on the point of the compass opposite to their former course; then the rear ship, having become the van, is to haul close by the wind on the same board; all the other ships are to haul up in succession, and range in the wake of the leading ship; and when the last ship is in her station, the order will be re-formed on the same tack.

Twelve Points.

If the wind changes twelve points exactly, the fleet must veer round together, and haul their wind in succession on the first tack.

2. *To Re-form the Order of Battle on the other tack, the wind coming forward less than Six points, or between Six and Twelve points.*

The wind coming forward, and the order of battle to be re-formed on the other tack. If the wind shifts ahead less than six points,

all the ships of the fleet are to veer round, till their heads come to the opposite point of the compass with respect to their former course; and then the rear ship, which is now become the van, is to haul close by the wind on that tack, and the other ships follow her in succession. From hence the fleet might pass to the line of battle on the former tack by veering in succession. If the wind comes ahead more than six points, but less than twelve, the fleet is to manœuvre in the same manner as before. If the wind comes ahead exactly twelve points, the tack is to be changed.

3. *Twelve Points—the wind coming aft and the Order of Battle to be re-formed on the same tack.*

When the wind shifts aft, and the order of battle to be re-formed on the same tack. If the wind has shifted less than two points, the leader hauls his wind, the fleet stands on as before, and each ship hauls her wind in succession as she gains the wake of the leader. If it is intended to change the tack, the whole fleet tack together, and the sternmost ship, which now becomes the leader, hauls up, and the rest bear down and haul up in succession.

On the other tack, the wind changing Sixteen Points.

If the wind changes sixteen points, all the ships brace about for the other tack immediately, by which means the fleet will be going four points large; then the ships tacking or veering instantly together, the order of battle will be restored or formed again on the same tack as they were before the wind changed.

CHAPTER VIII.

OF THE BATTLE.

Of the Line of Battle, and its advantages by being close.

In a naval engagement, the present mode, as has already been observed, is to draw up the fleet in a straight line upon one of the close-hauled lines under an easy sail. The frigates, fire-ships, transports, &c. are placed at proper distances on the other side, with respect to the enemy.* The distance between two adjacent

* Several able officers have been of opinion, that when fleets are ranged in order of battle, instead of being close-hauled, they should have the wind two points free, or upon the beam. Some of the reasons alleged in support of this opinion are, that the ships can more easily keep their stations; and if any ship should happen to fall to leeward, she may easily regain her station, which would be almost impossible were the fleet close-hauled.

ships in the line is usually about a cable's length ; but the commander-in-chief increases or diminishes this interval according to circumstances. The nearer, however, the ships are to each other, the stronger is the line, and the more difficult to be broken or forced by the enemy ; but still there must be a sufficient interval left, so that if a ship receive considerable damage, she may be got out of the line without becoming foul or falling aboard of the ship next astern, which would be the means of putting the whole line in confusion.

And composed of large ships though fewer in number.

The strength of a fleet depends also more on the largeness of the ships, and the weight of the metal, than in their number.—The fewer the number of ships in a fleet, the more distinctly will the signals be perceived and answered by those near the extremities of the line ; the better also will the order of battle be kept, and the fleet more easily manœuvred. A large ship is not so soon disabled as a small one ; and in the case of a three decker, although the upper deck should happen to be confused with the wreck of broken masts, yards, &c. and hence it being scarcely possible to work the guns on that deck, yet if the weather be not tempestuous, the guns on the other two decks may be worked. If boarding should be deemed practicable, it is evident that the large ship, upon account of the height of her side, as well as for other reasons, will have greatly the advantage over one of a less size. Large ships are also for the most part more able to encounter a storm than small ones ; and in a gale of wind, large ships have commonly the advantage in point of sailing. Hence it is obvious, that a fleet, composed of large ships, may have greatly the advantage over a fleet consisting of less ships, though much more numerous.

As in a naval engagement the two fleets are drawn up close-hauled, on two lines parallel to each other, one of these fleets is, therefore, to the windward of the other. The windward fleet has several advantages not possessed by the fleet to leeward, and the leeward fleet has also advantages over the weather fleet. The advantages and disadvantages of each of these fleets are as follow :—

Advantages of the Fleet to Windward.

The fleet to windward may approach the leeward fleet at pleasure, and can therefore determine the time of commencement of the action. If the weather fleet is more numerous, it may send down a detachment of ships on the rear of the leeward fleet, and thereby put it into confusion. If any of the ships of the fleet to leeward should be disabled, the fleet to windward may with great ease send down their fire-ships upon them, or send a detachment

after any part that gives way. The weather fleet may board if the commander-in-chief thinks proper ; and it is scarcely incommoded with the smoke, which is carried off by the wind to the fleet to leeward.

Disadvantages of the Fleet to Windward.

The disadvantages of the fleet to windward are, inability to quit the fight when once engaged, without being obliged to pass through the enemy's line, which is extremely dangerous ; because the ships being already very much injured before they are obliged to fly, they must expect to be still more so ; and as they have it no longer in their power to form the order of retreat, this manœuvre is absolutely a desperate one. If the fleet to windward tack altogether, in order to get off, the line to leeward may do the same, after having raked the weather ships in stays, and follow them on the other tack, with the advantage of having gained the wind of the centre and rear divisions of the flying line. If it blows fresh, it is seldom that weather ships have their lower deck guns sufficiently elevated ; whence it results, that the ship being a little inclined on the lee side, the guns often run out again at their ports after being fired, which very much retards the service of the artillery, since the guns are obliged to be bowsed in again every time for loading ; and oftentimes they can make no use at all of their lower tier. Again, such of the ships as are so disabled as to be obliged to quit the line, cannot easily do it, because in veering, for want of being able to tack, they fall between the two lines, where they are raked ahead, and by that means completely put in disorder : but should they be fortunate enough to be able to finish their evolution, it is still very difficult for them, disabled as they are, to get to windward of their line, and very often they fall foul of the next ships astern of them, which have it scarcely in their power to prevent the accident on account of the fire and smoke, especially if the line is much contracted ; and should these perceive it, and try to avoid being run foul of by falling back on their next ship astern, and so on thus successively, it might happen, that from one to the other a great part of the fleet being obliged to manœuvre, their fire would lessen, and very often cease, by their covering each other ; when, if the enemy take the advantage of this critical moment, the disorder increases, and all is lost. But these inconveniences may be partly prevented by having the disabled ships quickly towed out of the line by the boats of the fleet, which for that purpose should always be hoisted out from each ship before the engagement begins. Otherwise, if the ships in the weather line, not being too close, have the necessary space to observe what passes ahead of them, and to manœuvre, they ought to range themselves to leeward of the disabled ship, in order to cover her, and approach nearer to the enemy ; all the other ships bearing up also together to preserve the line.

Advantages of the Fleet to Leeward.

The ships in the line to leeward have the advantage of serving with facility and effect their lower deck guns in all weathers proper for fleets to come to action: they can quit the engagement at pleasure: their disabled ships can, without difficulty, quit their stations when necessity requires it: they can form the order of retreat with more readiness, or continue the action as long as convenient: in short, the lee line of battle, if superior in number, can also double the enemy, by making some of the ships in the van or rear to tack, and put one of the extremities of the enemy's line between two fires; and if they are formed in time, they may cannonade the enemy while bearing down to the attack.

And its Disadvantages.

The disadvantages of the fleet to leeward are, its being very much annoyed by the smoke, and a continued shower of fire from the wads falling on board, propelled by the wind, which if not attended to may be productive of dreadful consequences. The ships of the line to leeward cannot attempt to board those of the other, whatever may be their inclination for it; they can hardly do more than accept the battle, without being able to determine either time or distance: it is even with great difficulty that they can avoid being boarded, or prevent their line from being broken, if the weather ships are bent upon doing it; and their fire-ships are very seldom of use.

No general rule for preferring the one to the other.

A general rule for the adoption of either the weather or lee gage cannot be laid down. Sometimes the one is preferable, and sometimes the other; and very often the commander-in-chief has it not in his power to make an option.

Having proceeded so far with respect to the line of battle, it may not be improper to introduce in this place an account of a naval engagement, with the conduct to be observed previous to, and during the time of, its continuance.

The Action not to begin before the Signal is made for that purpose.

The engagement will not begin till the commander-in-chief makes the signal, unless an action is insensibly brought on by some unavoidable circumstance in the line, or position of the van or rear of both fleets in forming or approaching each other. The commander-in-chief in such case will make the proper signal for the van or rear, by the distinguishing flag of either of these divi-

sions, which will undoubtedly regulate the necessary manœuvres of the rest of the fleet throughout the whole line.

Precautions to be observed during an engagement.

During the time of an engagement the greatest silence is to be observed in each ship; no one must quit his post upon pain of death; and should any one happen to refuse obeying an officer, he shall be put to death on the spot; the same also shall be done to any one who shall hide himself, or feign to be wounded. The wounded must be carried or conducted to the surgeon by those who have been appointed by the captain for that purpose. Should any one discover an advantage to be taken, he shall inform the officer who stands nearest him. No kind of rigging whatever is to be touched without an order. Should any dangerous shot be received at the water-line of the ship, such of the caulkers, or carpenters, or any other person who perceives it, shall inform, in private, the captain without saying a word of the same to any one else upon pain of death, unless it be a superior officer; the same precaution shall also be observed about any part of the ship catching fire.

The Fleet to carry little sail.

Whilst the fleets are engaged, the commander-in-chief carries but little sail: in this, however, he must conduct himself by the motions of the enemy, the ships always observing to keep close in the line; and if any ship happen to get out of the line, the ship which immediately follows is to pay no regard to her, but endeavour to keep her station in the line.

No Captain to quit his post in the line.

A captain must not quit his post in the line upon any pretence whatever, unless his ship should be so greatly damaged as to render her incapable of continuing the action. The little sail a fleet is under at such a time may, in general, give ships, though damaged in their rigging, &c. time enough to repair their defects, without causing an unnecessary interruption in the line, by withdrawing out of action when their service might, perhaps, be of the utmost importance to the rest of the fleet.

Nor make an attack without order from the Commander-in-chief.

A captain, through too impetuous a desire of distinguishing himself, ought never to break the order of the line, however inviting the advantage of an attack might then appear to him to secure

success: he must wait with patience the signal of the commander-in-chief or commanding officer of his division, because it is always more essential to preserve and support a close line in action, as it constitutes the principal strength of a fleet in general, than to attend to a particular attack between two ships which commonly decides but little with regard to the whole, however glorious in appearance, unless with a view at the same time of taking or destroying a flag-ship of the enemy's, and where success alone, even then, can justify the attempt.

The Commander-in-chief to be supported by his Seconds.

The two immediate seconds to the commander-in-chief ought to direct part of their fire against the enemy's flag-ship, or any other that may attack their commander-in-chief; so that their chief attention should be employed more in his defence than in that of their own proper ship, as they must sacrifice every other consideration to the honour of their flag.

The same attention must likewise be paid to any other ship that may find herself engaged with one of the enemy's flag-ships; the next to her ahead and astern should serve in that respect as seconds, by dividing part of their fire against such flag-officer, in order to make him strike the sooner.

If any flag-officer stand in need of being assisted, he will, of course, make a signal for the corps of reserve; or if there should be none, he will signify the same to his division; on which his two seconds, with those nearest him, will close in to cover him, and continue the action. The frigates of his squadron will likewise be ready to give him the necessary assistance; and if he should still continue the attack, he will, in a particular manner, be supported by his whole division.

And the Ships mutually to protect each other.

Those ships which happen to be most exposed to danger will naturally make the ordinary signals upon the occasion, if they should receive any hurt or damage, in order to be supported by such of the line as are nearest to them.

The Body of Reserve.

When a fleet is so far superior in number as to be able to extend itself both ahead and astern considerably beyond the enemy's line, the commander-in-chief generally forms the excess into a body of reserve, drawn up in a line on the other side of the fleet with respect to the enemy.

Formed in a line with the Frigates.

If the body of reserve is to windward, the ships composing it are to be drawn up in a line with the frigates nearest abreast of

the centre ; but if to leeward, a little ahead of them ; being careful at the same time to keep within reach of observing distinctly all the signals and motions of the fleet, and to be ready to replace such of the ships as may happen to be dismasted or driven out of the line, where all intervals must be properly strengthened, and carefully filled up again without loss of time. The body of reserve is usually formed at the same time with the line, to prevent any irregularity that may happen on leaving any intervals or openings ; yet the commander-in-chief may draw ships out of the line to form a body of reserve, according to the time and circumstances of his situation.

The oldest Captain, except the Commander, to relieve the first disabled ship.

The eldest captain, after the senior officer who commands the body of reserve, ought to relieve the first, or close that part of the line which the disabled ship has been obliged to quit ; and so on successively of the rest.

The whole Body of Reserve not to be detached unless in case of emergency.

The commanding officer of the body of reserve will not be detached with the whole corps, unless on some pressing occasion, to fortify the line, where such a reinforcement is absolutely necessary. If to defend one of the flag-officers of the three squadrons, he will be followed by the next senior officer of the reserve who was not before detached, in order to place themselves as seconds, the first ahead and the other astern of the flag they are to support, without any diminution of the honour of his own proper seconds at the same time, as they are only called in through necessity on that emergency, being not engaged before, and consequently better able to assist and support the commander-in-chief ; their duty being likewise to exert their utmost efforts in attacking, or, if possible, in boarding, the enemy's flag-ship, to force him to yield, except they are particularly ordered off to some other quarter or part of the line.

The Commander-in-chief may order the whole body to reinforce either of the Squadrons.

The commander-in-chief will sometimes order the whole body of reserve to reinforce one of the three squadrons of the fleet, as he may see occasion ; which, when he does, the body must make all the sail it can, that each ship may place herself successively, the first in the first interval, the second in the second interval, and so on throughout. If a part only of the body of reserve is wanted, the proper signal will be made accordingly.

The Body of Reserve to rejoin the Line.

When the commander-in-chief has no further occasion for the body of reserve, he will make the proper signal for the ships composing it to resume their respective posts in the line, and those ships will repeat the signals.

In case a Captain should think Boarding practicable.

If any captain in the fleet think he can board with success one of the enemy's ships, he will signify the same to the commander-in-chief by hoisting the boarding-flag, together with his particular pendant to be more plainly distinguished: the commander-in-chief in return will make the proper signal of approbation, or otherwise if he disapprove of the attempt, by letting fly that ship's particular pendant that she may observe the signal the better. Before the captain make the signal, he ought to consider well the ill consequences that might attend such an enterprise if he should fail of success; for the breaking of the order or disposition of the line, by quitting his post, may be of much greater disadvantage to the whole, than any advantage arising from his victory, except that over a flag-ship.

The Fire-ships to prepare when the signal is made to engage.

When the commander-in-chief makes the signal for his fleet to prepare for action, the fire-ships will, at the same time, get ready their grappling-irons, fire-engines, &c. for boarding. and will likewise dispose all their combustibles into their proper channels of communication, &c. as soon as possible after the action begins: all which, when ready, they will take care to make known by signal to the particular division or squadron they belong to, and they of course will repeat the same to the commanders-in-chief.

To be out of the reach of the enemy's guns.

The fire-ships must be particularly careful in placing themselves out of the reach of the enemy's guns, which they may do abreast and under shelter of their own ships in the line, and not in the openings between the ships, unless to prevent any of the enemy's ships that should attempt to force through their line, when they must, in such cases, use their utmost efforts to prevent them: they ought always to be very attentive to the commander-in-chief's signals, as well as those of the commanding officer of the particular squadron they belong to, that they may lose no time when the signal is made for them to act, which they must quickly answer by a signal in return.

The Fire-ship, in her way to the enemy, to be assisted by the ship ahead of which she passes.

Although no ship in the line should be particularly appointed to lead on or protect the fire-ships, besides the frigates already ordered for that particular purpose ; yet the ship ahead of which the fire-ship passes in her way to the enemy, whatever division she may belong to, is to escort her, and must assist her with a boat well manned and armed, as well as any other succour she may stand in need of: the two next ships to her must likewise give her all necessary assistance. The captain of a fire-ship is to consider, in short, that he is answerable for the event, in proportion as he expects to be honourably rewarded if he succeed in so daring and hazardous an enterprise.

Particular description of a Naval Engagement between two Ships.

Since a general engagement of fleets or squadrons of men of war is nothing else than a variety of particular actions of single ships with each other, in a line of battle, it may not be improper to begin by describing the latter, and then proceed to represent the usual manner of conducting the former.

Divided into Preparation, Action, and Repair.

The whole economy of a naval engagement may be arranged under the following heads ; namely, the preparation, the action, and the repair or refitting for the purposes of navigation.

The Preparation.

The preparation is begun by issuing the orders to clear the ship for action, which is repeated by the boatswain and his mates at all the hatchways or staircases leading to the different batteries. As the management of the artillery, in a vessel of war, requires a considerable number of men, it is evident that the officers and sailors must be restrained to a narrow space in their usual habitations, in order to preserve the internal regularity of the ship. Hence the hammocks, or hanging beds, of the latter are crowded together as close as possible between the decks, each of them being limited to the breadth of 14 inches. They are hung parallel to each other, in rows stretching from one side of the ship to the other, nearly throughout her whole length, so as to admit of no passage but by stooping under them. As the cannon, therefore, cannot be worked while the hammocks are suspended in this situation, it becomes necessary to remove them as quickly as possible. By this circumstance a double advantage is obtained : the batteries of cannon are immediately cleared of an encumbrance, and the

hammocks are converted into a fort or parapet, to prevent the execution of small shot on the quarter-deck, tops, and forecastle. At the summons of the boatswain, *up all hammocks!* every sailor repairs to his own, and, having stowed his bedding properly, he cords it up firmly with a lashing or line provided for that purpose. He then carries it to the quarter-deck, poop, or forecastle, or wherever it may be necessary. As each side of the quarter-deck and poop is furnished with a double net-work, supported by iron cranes fixed immediately above the gunnel or top of the ship's side, the hammocks thus corded are firmly stowed by the quarter-master between the two parts of the netting, so as to form an excellent barrier. The tops, waist, and forecastle, are then fenced in the same manner.

Whilst these offices are performed below, the boatswain and his mates are employed in securing the sailyards, to prevent them from tumbling down when the ship is cannonaded, as she might thereby be disabled, and rendered incapable of attack, retreat, or pursuit. The yards are now likewise secured by strong chains or ropes, additional to those by which they are usually suspended. The boatswain also provides the necessary materials to repair the rigging, wherever it may be damaged by the shot of the enemy, and to supply whatever parts of it may be entirely destroyed.—The carpenter and his mates, in the meanwhile, prepare shot-plugs and mauls, to close up any dangerous breaches that may be made near the surface of the water; and provide the iron-work necessary to refit the chain-pumps, in case their machinery should be wounded in the engagement. The gunner with his mates and quarter-gunners is busied in examining the cannon of the different batteries, to see that their charges are thoroughly dry and fit for execution; to have every thing ready for furnishing the great guns and small arms with powder as soon as the action begins; and to keep a sufficient number of cartridges continually filled to supply the place of those expended in battle. The master and his mates are attentive to have the sails properly trimmed, according to the situation of the ship; and to reduce or multiply them, as occasion requires, with all possible expedition. The lieutenants visit the different decks, to see that they are effectually cleared of all encumbrance, so that nothing may retard the execution of the artillery; and to enjoin the other officers to diligence and alertness, in making the necessary dispositions for the expected engagement, so that every thing may be in readiness at a moment's warning.

When the hostile ships have approached each other to a competent nearness, the drums beat to arms: the boatswain and his mates pipe, *all hands to quarters!* at every hatchway: all the persons appointed to manage the great guns immediately repair to their respective stations: the crows, handspikes, rammers, sponges, powder-horns, matches, and train tackles, are placed in order by the side of every cannon: the hatches are immediately laid,

to prevent any one from deserting his post by escaping into the lower apartments : the marines are drawn up in rank and file on the quarter-deck, poop, and forecastle : the lashings of the great guns are cast loose, and the tompions withdrawn : the whole artillery, above and below, is run out at the ports, and levelled to the point-blank range, ready for firing.

The Action.

The necessary preparations being completed, and the officers and crew ready at their respective stations to obey the order, the commencement of the action is determined by the mutual distance and situation of the adverse ships, or by the signal from the commander-in-chief of the fleet or squadron. The cannon being levelled in parallel rows projecting from the ship's side, the most natural order of battle is evidently to range the ships abreast of each other, especially if the engagement is general. The most convenient distance is properly within the point-blank range of a musket, so that all the artillery may do effectual execution.

The combat usually begins by a vigorous cannonade, accompanied with the whole efforts of the swivel guns and the small arms. The method of firing in platoons, or volleys of cannon at once appears inconvenient in the sea-service, and perhaps should never be attempted unless in the battering of a fortification. The sides and decks of the ship, although sufficiently strong for all the purposes of war, would be too much shaken by so violent an explorion and recoil. The general rule observed on this occasion throughout the ship, is to load, fire, and sponge the guns with all possible expedition, yet without confusion or precipitation. The captain of each gun is particularly enjoined to fire only when the piece is properly directed to its object, that the shot may not be fruitlessly expended. The lieutenants, who command the different batteries, traverse the deck to see that the battle is prosecuted with vivacity ; and to exhort the men to their duty. The midshipmen second these injunctions, and give the necessary assistance, wherever it may be required, at the guns committed to their charge. The gunner should be particularly attentive that all the artillery is sufficiently supplied with powder, and that the cartridges are carefully conveyed along the decks in covered boxes. The havoc produced by a continuation of this mutual assault may be readily conjectured by the reader's imagination : battering, penetrating, and splintering the sides and decks ; shattering or dismounting the cannon ; mangling and destroying the rigging ; cutting asunder or carrying away the masts and yards ; piercing and tearing the sails so as to render them useless ; and wounding, disabling, or killing the ship's company ! The comparative vigour and resolution of the assailants to effect these pernicious consequences in each other, generally determine their success or defeat: we say generally, because the fate of the combat may sometimes

be decided by an unforeseen incident, equally fortunate for the one and fatal to the other. The defeated ship having acknowledged the victory by striking her colours, is immediately taken possession of by the conqueror, who secures her officers and crew as prisoners in his own ship ; and invests his principal officer with the command of the prize until a captain is appointed by the commander-in-chief.

Repair.

The engagement being concluded, they begin to repair : the cannon are secured by their breechings and tackles with all convenient expedition. Whatever sails have been rendered unserviceable are unbent ; and the wounded masts and yards struck upon deck, and fished or replaced by others. The standing rigging is knotted, and the running-rigging spliced wherever necessary. Proper sails are bent in the room of those which have been displaced as useless. The carpenter and his mates are employed in repairing the breaches made in the ship's hull, by shot-plugs, pieces of plank, and sheet-lead. The gunner and his assistants are busied in replenishing the allotted number of charged cartridges, to supply the place of those which have been expended, and in refitting whatever furniture of the cannon may have been damaged by the action.

Such is the usual process and consequence of an engagement between two ships of war, which may be considered as an epitome of a general battle between fleets or squadrons. The latter, however, involves a greater variety of incidents, and necessarily requires more comprehensive skill and judgment in the commanding officer. A short account of which also we shall next proceed to lay before our readers.

Description of an Engagement between two Fleets.

When the commander-in-chief of a naval armament has discovered an enemy's fleet, his principal concern is usually to approach it, and endeavour to come to action as soon as possible.—Every inferior consideration must be sacrified to this important object, and every rule of action should tend to hasten and prepare for so material an event. The state of the wind, and the situation of his adversary, will in some measure dictate the conduct necessary to be pursued with regard to the disposition of his ships on this occasion. To facilitate the execution of the commander-in-chief's orders, the whole fleet is ranged into three squadrons, each of which is classed into three divisions, under the command of different officers. Before the action begins, the adverse fleets are drawn up in two lines, as formerly described. As soon as the commander-in-chief displays the signal for the line of battle, the several divisions separate from the columns, in which they were

disposed in the usual order of sailing, and every ship crowds sail to get into its station in the wake of the next ahead; and a proper distance from each other is regularly observed from the van to the rear. The commander-in-chief, however, will occasionally contract or extend his line, so as to conform to the length of that of his adversary, whose neglect or inferior skill on this occasion he will naturally convert to his own advantage, as well as to prevent his own line from being doubled; a circumstance which might throw his van and rear into confusion.

When the adverse fleets approach each other, the courses are commonly hauled up in the brails, and the topgallant-sails and staysails furled. The movement of each ship is chiefly regulated by the main and fore-topsails and the jib; the mizen-topsail being reserved to hasten or retard the course of the ship; and, in fine, by filling or backing, hoisting or lowering it, to determine her velocity.

The signal for a general engagement is usually displayed when the opposite fleets are sufficiently within the range of point-blank shot, so that they may level the artillery with certainty of execution, which is near enough for a line of battle. The action is begun and carried on throughout the fleet in the manner we have already described between single ships. The various exigencies of the combat call forth the skill and resources of the commander-in-chief to keep his line as complete as possible when it has been unequally attacked; by ordering ships from those in reserve to supply the place of others which have suffered greatly by the action; by directing his fire-ships at a convenient time to fall aboard the enemy; by detaching ships from one part of the line or wing which is stronger to another which is greatly pressed by superior force, and requires assistance. His vigilance is ever necessary to review the situation of the enemy from van to rear; every motion of whom he should, if possible, anticipate and frustrate. He should seize the favourable moments of occasion, which are rapid in their progress, and never return. Far from being disconcerted by any unforeseen incident, he should endeavour, if possible, to make it subservient to his design. His experience and reflection will naturally furnish him with every method of intelligence to discover the state of his different squadrons and divisions. Signals of inquiry and answers, of request and assent, of command and obedience, will be displayed and repeated on this occasion. Tenders and boats will also continually be detached between the commander-in-chief and the commanders of the several squadrons or divisions.

As the danger presses on him he ought to be fortified by resolution and presence of mind; because the whole fleet is committed to his charge, and the conduct of his officers may, in a great degree, be influenced by his intrepidity, and perseverance. In short, his renown or infamy may depend on the fate of the day.

CHAPTER IX.

MANŒUVRES PERFORMED BY ADVERSE FLEETS WHEN IN SIGHT OF EACH OTHER.

To dispute the Wind with the Enemy.

When the enemy is to windward, and it is wished to gain the weather-gage of him, the fleet to leeward should avoid extending itself the length of the enemy's line, in order to oblige them to edge down upon theirs, if they intend to attack them ; which will be a mean, if they still persist in doing so, of losing the advantage of the wind.

It is impossible for a fleet to leeward to gain to windward so long as the enemy keep their wind, unless a change happens in their favour : therefore, all that a fleet to leeward can do, must be to wait with patience for such a change which they will undoubtedly avail themselves of, as well as any mistake or inadvertency the enemy may commit in the mean time. And as long as the fleet to leeward does not extend its line the length of the enemy's, it will be impossible for the latter to bring them to action without running the hazard, by bearing down, of losing the advantage of the wind, which both fleets will be so desirous of preserving.

Hence, that a commander-in-chief may benefit by the shifts of the wind that frequently happen, he must in a manner force them; which will not appear so extraordinary to officers of any experience, who know what winds reign most on the coast, or off the head-lands, where they may expect an enemy ; and though a commander-in-chief may be sometimes out in his conjecture, he also as often succeeds so happily as to gain the advantage of his enemy. The disposition of projecting head-lands, and the setting of tides or currents, also contribute greatly towards gaining the wind of the enemy.

Again, the fleet to windward ought to keep that to leeward as much as possible always abreast of it ; because, by doing so, they will preserve the advantage they have, unless the wind changes much against them. They should force them likewise to keep their wind, unless they think it more prudent not to engage ; but when that is the case, they should keep entirely out of sight.

The following observations, with respect to the shifting of the wind, are given by M. Bourde de Villehuet :—

1. If the weather fleet be in order of battle, and the wind draw ahead, the lee fleet, if they be ahead and in order of battle, ought to box off on the same tack as before, in order to tack in succes-

sion in the wake of one another, to restore the order of battle; drawing at the same time a great deal to windward. This manœuvre may even be the means of weathering the enemy, if the wind should shift much; for they have no other method to regain the order of battle, without losing much ground: though they will always lose a great deal with respect to the position of the enemy to leeward.

2. If the lee fleet be astern, and the wind shifts aft while they are on the contrary tack with the enemy in order of sailing on one line, the lee fleet ought to tack or veer altogether, and at the same instant: because this shift of wind will be ahead for all the ships in respect to their tacks then on board, and astern in respect to the order of battle. When the van ship is full on the other tack, as well as all the rest in their former order of battle, she shall haul by the wind, while the rest of the fleet run large on their first line of battle as many points as the wind has shifted aft, to get into her wake successively, and restore the order of battle while approaching the enemy; by which they gain the wind of him, or else double him if the shift has been great; for the only means they have of restoring the line of battle is by the van ship hauling by the wind, and the rest coming into her wake in succession. If the shift of the wind was four points, the fleet to leeward would be obliged still to perform the same manœuvre, that they might go about, after a certain time, successively to windward of the enemy, who could only in the mean time have tacked all together, to bring their fleet suddenly in a line of battle on the other board.

If, when the wind shifts aft, the lee fleet is astern in order of battle, and the enemy be on the other tack in the order of sailing, the leading ship must haul close to the wind immediately, while the other vessels will, in succession, bear away as many points as the wind has shifted, in order to perform the same manœuvre and restore the line of battle. By observing this mode of manœuvring, you will approach the enemy, and gain as much to windward of him as possible, or get even the weather-gage of him entirely, if the wind has shifted considerably. The rear ship of the fleet to leeward may immediately keep close to this new wind on the same board, while all the rest of the fleet, after having tacked together and at the same time, will come and place themselves close by the wind in her wake, where they are again to tack successively, in order to follow their rear ship, which is now become the leader, and which may break the enemy's line, or at least gain the wind of him. But, to be able to go through this evolution, you must have nothing to fear from the enemy; for the fleet will be obliged to go about twice before the order of battle can be restored.—The weather fleet ought to keep their wind as close as possible, holding the enemy always exactly to leeward of them, by keeping on the same tack as he; and if the wind shifts a little, and becomes favourable to the enemy which is to leeward, the wea-

ther ships are to keep exactly their wind, without caring for the preservation of the line, unless the two fleets be very near one another.

To force the Enemy to Action when he is to Windward.

When two adverse fleets are in sight of each other, an engagement is almost unavoidable: for since it may be presumed that the fastest sailing ships of the one fleet will sail faster than the slowest sailing vessels of the other fleet; hence the fleet that is in pursuit will gain upon the other. The lee fleet, which is wishing to bring on an engagement, must therefore keep always on the same tack with the weather fleet; and taking care to keep them so exactly abreast as to prevent the least danger of losing sight of them, and hence be ready to take the advantage of the first favourable shift of wind to make the attack. Night is certainly the time when an alteration of the course may be best attempted. But the lee fleet is to have frigates on the look-out; which, by signals, will continually give notice of the manœuvre and course of the retreating fleet to windward; which, by these means, is always exposed to be pursued without being able to get off unseen, and must sooner or later be compelled to come to action, unless they can get into some port, or a gale of wind should come to rescue them by dispersing both fleets, and thus furnish the means of retreating in a storm.

When the Enemy is to Leeward.

If the lee fleet keep close to the wind in the order of battle, the fleet to windward is to stand on in the same manner till it is abreast of the enemy, ship to ship, when they are all together, and at the same time, to bear away, and steer exactly so as to bring their respective opponents, in the adverse line, on the same point of the compass with them; observing the principles of chasing, which are to be observed by every chaser to windward. Thus the fleets will be near enough to begin the action, in presenting the bow of each ship to her opponent in the order of sailing, which will be easily changed for the line of battle, by all the ships hauling close to the wind together, in the moment which precedes the beginning of the action.

If the fleet to leeward be inclined to engage, it might bring to, to prevent losing time; as, by this manœuvre, less time will be requisite for the weather fleet to join them: then they will fill as soon as the action begins, because it is more favourable to a lee line to be advancing ahead; since, if a ship be disabled in the weather line (which is obliged to follow with the topsails full), she will infallibly drop, and run foul of the next vessel astern of her, covered with fire and smoke, which may be productive of great disorder.

As the lee fleet fills and stands on close by the wind, it is necessary that the weather line should be abreast and parallel to the other before they bear away to come within the requisite distance for action, in order that the van ship of the weather fleet should always keep to windward of the leading ship of the line, and be guarded against such a shift of wind as might come ahead: which would not be the case if they were astern of the van ship in the lee fleet; which, as well as the rest of the line, would be able then to double them to windward, by tacking in succession.

Another reason for the weather line being right abreast of the enemy to leeward, and for every ship steering on the same point in approaching her opponent in the leeward line of battle, is, that the fleets may be placed exactly parallel to each other; for, as the weather line must not be astern, because of the risk of the wind coming more forward, neither must they be ahead of the line to leeward, in case the wind should come aft; for then the lee fleet, keeping close by the wind in the wake of their leading ship, might, by this shift, be as far to windward as the opposing fleet, or even get the weather-gage of them. But if the weather fleet keep exactly abreast of the other, they will always be in a situation to preserve their advantage without exposing themselves. It is, notwithstanding, that those ships keeping more away than the line to leeward will find themselves, when come within gun-shot, in a very disagreeable situation with respect to the enemy's ships, which will have it then in their power to rake them as they bear down. This may occasion much disorder among the ships of the weather line, which, for that moment, have it not in their power to fire their whole broadside at the enemy, who has the advantage of beginning the action.

If the lee fleet bear away four points to move their order of battle on the other tack and avoid the action, filing off in succession in the wake of the van ship, the weather line, by bearing away altogether eight points, cannot fail, as both fleets are supposed to sail equally, to pass through the middle of their line, and force them to fight with disadvantage, if their extent be double the distance between the two fleets. If the extent of the fleet be less than the above limitation, then the weather fleet will divide the lee fleet more unequally; and if the distance between the fleets be considerable, the weather fleet will not be able to break through the line.

If the lee fleet bear away four points all together, being of equal extent with the fleet to windward, and their distance from each other equal to half the length of one of the lines; should the weather fleet bear away at the same time eight points, they will approach very near the sternmost of the retreating fleet; but they will not have it in their power to cut off any part of that fleet, even with an equality of sailing: so that the only advantage gained by this manœuvre will be an ability of attacking the rear, and bringing it to action.

If the van ship and the rest of the weather fleet had a sufficient velocity to keep the centre ship of the lee line on the same point of bearing; in that case the leading ship may break through the enemy's line about the middle ship of the centre division: for, supposing the fleets in order of battle, on the starboard tack, steering east, with the wind at south-south-east, being at two leagues distance from each other, both the lines being four leagues in extent; then the lee line bearing away all together four points, will run north-east, while the fleet to windward, bearing away all together eight points, will steer north; the van ship of which will keep the centre division of the lee line on the point of bearing north-west. As she is supposed to be able to continue in this position, it follows, that the van of the weather line must close the centre of the flying line to leeward, after having run four leagues. The time and distance necessary to cut off a retreating fleet may always be known according to the last supposition. Should the lee fleet get upon the other tack and run large, still preserving the order of battle, they will be still sooner closed and forced to action by the weather fleet who have only to keep away from eight to nine points on the same tack, to run right before the wind.

The weather fleet can always force the lee one to action, whatever movements they make; for, if they run with the wind right aft in order of battle, they cannot, supposing an equality of sailing, avoid being closed or broken nearly about the centre by the weather line, which has only to steer two points on each tack nearer the wind than the retreating fleet. So that the rear of the weather fleet having bore away no more than eight points, will be found at the end of a certain time to have approached extremely near the centre of the retreating fleet; and, in a short time more, will be able to bring their rear to action. The weather fleet have yet another advantage; because, as their ships have the wind on the quarter, they sail with greater celerity than those of the lee fleet, which run before the wind. The lee fleet being absolutely determined to fly, has therefore no other expedient left to prolong time but to combat in the order of retreat right before the wind, or on the same course as the pursuing fleet: for other advantages are not to be relied on, if pursued by a victorious foe.

If from all that has been said, it results that it is not possible for a fleet of equal force to avoid an action, how then must it be with one much inferior? The more numerous has nothing to do but to form a detachment of superior sailers, which will gain upon the lee fleet and begin the action, while some others approach to finish it. Whence we may conclude, that when in presence of too powerful an enemy, it will never be possible to avoid an action if he is determined to come to one.

To avoid coming to Action when the Enemy is to Windward.

The lee fleet, which is wishing as much as possible to avoid an engagement, ought to form the order of retreat to fly from the enemy if they are in view of him, and run on the same tack as their chaser. But if he is yet out of sight and they have intelligence of his approach by their frigates which are looking out, they may run large from the hostile fleet, without confining themselves to keep the wind exactly aft, unless they be in the order of retreat. There are, however, circumstances when the lee fleet may run with the wind aft, without assuming the order of retreat; as, for example, when they wish to gain time, or are resolved to engage the enemy, if they still continue to pursue them. But except on such extraordinary occasions, a fleet should not fly before the enemy without being in the order of retreat, as the rear is then in the best situation to extricate themselves in case of accident.

When the Enemy is to Leeward.

The weather fleet can scarcely ever be forced to engage; because it can always continue on that tack which increases its distance from the enemy, by standing on one tack, while the enemy continues upon the other. If the wind was to remain on the same point of the compass for any considerable space of time, it would be very easy for the fleet to windward to keep in sight of the enemy, without being under any apprehensions of being forced to come to action; but the inconstancy of the wind obliges the most experienced commander to avoid meeting the enemy when he thinks it improper to engage him.

TO DOUBLE THE ENEMY, OR TO BRING A PART OF HIS FLEET BETWEEN TWO FIRES.

1. *When the Enemy has the Weather-gage.*

The fleet which attempts to double an enemy, ought always to be superior to him in number of ships. The lee fleet ought to endeavour to range exactly abreast of, and parallel to, the weather fleet, so that the van or rear may extend beyond their line in order to overreach them, by tacking in succession to double to windward their van or rear, and bring them between two fires. Provided this manœuvre be properly executed, it will be impossible for the ships in the weather line, thus pressed, to continue long in their ports; for there is no vessel closely attacked by two others of equal force which can long resist being overcome, since it is always in the power of one of them to get into such a position as to be able, without much danger on her side, to destroy the enemy in a very short time. But whether the most advantageous evolu-

tion is to double the van or the rear, is necessary to be considered ; for there is so considerable an advantage attending each of these evolutions, that either of them may, in a very little time, determine the fate of the battle.

As, in the present case, the enemy is supposed to be to windward, either their van or rear may be doubled : but the van may with the greatest facility, because, if they are engaged by the ships abreast of them, those which are advanced ahead will be able, by making all sail, to get on the perpendicular to the direction of the wind with the van of the enemy, and tack in succession to gain the wind of them on the other board, thus keeping them to leeward ; and when they are come sufficiently to windward, they are again to go about, in order to keep the two headmost ships of the enemy's line continually under their fire. If there be two or three ships to tack in succession and gain the wind of the enemy, they may edge down on the van of the weather line at pleasure, keeping themselves a little to windward of it : and as that van is already engaged by the other ships abreast on the other side, she must necessarily be soon disabled. If they bear away, they must drop upon the line with which they are engaged to leeward, while the ships to windward still continue to cannonade them. If they attempt going about, in order to attack more closely the ships to windward, they will be raked, while in stays, by their opponents to leeward and to windward, who enfilading them with whole broadsides, which they cannot return, must absolutely complete their disorder. If they make sail, in order to frustrate the design of the ships inclined to double, those with which they are engaged abreast to leeward have only to perform the same manœuvre, and keep them under their fire ; while the others, after having harassed them as much as possible, will do their best to perform the same manœuvre on the succeeding ships.

The captains destined to double the enemy ought to be men of known ability, as well as of approved courage. They should not be ordered upon that service but in weather fit for sailing at the rate of three knots an hour at least ; and, for the greater promptitude and certainty of success, none but the best going ships are to be employed.

If any of the ships in the van of the weather line happen to be disabled in their masts or yards, as will most probably be the case after having been between two fires, they will drop astern and run foul of the next which follows, and these again of their subsequent comrades ; at last, disorder will become prevalent, by ships running foul of each other, or manœuvring to avoid the same accident : so that the order of battle will be broken ; while, on the other hand, the line to leeward is preserved with all the advantage possible. The ships which have gained the wind of the enemy will, by continuing their manœuvre, augment the confusion ; engaging, however, no more than they like ; and if, by chance or misfortune, they should be crippled, it will not certainly be an

easy matter for them to extricate themselves. But as they may, on the other tack, drop astern to windward of the enemy's line, or veer again like him, they must extricate themselves as well as they can, and always advantageously enough if, by doubling the van, they are able to throw it into disorder.

If the rear of the lee fleet be extended beyond the sternmost ship of the weather line, they will be obliged, if they want to double the rear of the enemy to windward, to make sail and tack in succession; in which manœuvre the headmost ship of those destined for this service is to go about first; then, continuing to keep up a brisk cannonade as they come to the wind, they will go and heave about again a little to windward of the rear of the enemy, in order to bring their stern ships between two fires: and should they have the good fortune to oblige them to bear away, they must go on successively from one ship to another, as long as they find they succeed in forcing them to give way. Should disorder take place in the rear of the weather fleet, it will not be near so prejudicial to the enemy as if it had happened in the van; on the contrary, it may turn out to be of some advantage to them. But the vessels combating to windward can easily withdraw from the fight, by backing astern when they find themselves too hard pressed.

2. *When an Enemy is to Leeward.*

The ships of the weather line having extended their van beyond that of the lee line, are to veer, in order to bring the headmost ships of the enemy's line between two fires. But let them do as they will, there never can result so much advantage from this manœuvre as when doubling a fleet to windward, because the disabled ships can always veer with facility. True it is, they cannot fail becoming at the same time the prey of the enemy; for both those which have doubled them, and those with which they are engaged abreast in the weather line, will always have it in their power jointly to press as close as they think proper.

If the ships which have doubled the van of the lee fleet, with which they are engaged, be disabled, they will be obliged, as they cannot make sail, to pass along the lee line; and they cannot escape being totally destroyed if they do not bear away before the wind, to get out of gun-shot; during which manœuvre they cannot avoid being still in a very disagreeable situation.

Should the sternmost ships of the weather fleet be disabled in doubling the enemy's rear, they have only, if they want to extricate themselves, to drop astern, and let the two fleets advance ahead: and after having refitted themselves, they will reassume their posts.

TO AVOID BEING DOUBLED.

1. *The Enemy being to Windward.*

For this purpose, it has been proposed to extend the line, by leaving a greater interval between the ships towards the centre than in the van or rear; but in this case the line runs the risk of being divided, unless prevented by a corps de reserve, consisting of a few ships of the line and fire-ships. It has also been proposed as a general rule, that the flag-officers of the lee fleet should oppose themselves to those of the enemy; by which means several of the enemy's ships will be rendered useless in the intervals. This method has, however, its inconveniences; as sometimes the van and rear of each division may be exposed to the fire of two ships at the same time: nor is the last division out of danger of being doubled. In order to remedy these defects, the larger ships ought to be placed in the van and rear of each division; and the whole fleet must regulate its sailing in such a manner that the rear of the enemy may not be astern of the rear of the last division.

Other methods have been proposed to avoid being doubled; as, that each squadron of the lee fleet should attack its corresponding squadron in the weather fleet; each division of the lee fleet, however, extending its line far enough to prevent the enemy from leaving any ships astern of it, but rather ahead. It has also been proposed, that the lee fleet should extend its line as long as the enemy's line. This method will be advantageous for the lee fleet, provided it is composed of ships of superior force, though fewer in number, than the enemy. In other cases, it is probably the worst method that can be followed by the lee fleet, as it gives the enemy's fleet all the advantage it can desire of exerting its whole force upon the inferior line.

2. *When the Enemy is to Leeward.*

The weather fleet is to keep astern of the enemy, so that the van of the weather fleet may be opposed to and attack the enemy's centre; hence the enemy's van will become useless for some time; and if it should attempt to tack and double upon the weather fleet, much time will be lost in performing that evolution, and it also runs the risk of being separated by the calm which generally happens in the course of a sea engagement in consequence of the continual discharge of cannon. A considerable interval might also be left between the centre and van, provided the necessary precautions be taken to prevent the van from being cut off.

To force the Enemy's Line.

This is a manœuvre which the lee fleet may execute to gain the advantage of the wind. It is performed by the van ship, if within gun-shot, tacking when she and the centre ship of the weather line are on a perpendicular to the direction of the wind; then all the lee fleet tack in succession, and thus may pass through the enemy's line, or, perhaps, a little more towards the enemy's van, and go about again in succession to windward of him. But as he will not be long, without doubt, before he performs the same manœuvre, he will thus be able to regain the wind, if he be not forced to give way before his evolution is finished. The enemy to windward may even cause his van ship to tack, as well as the rest of the van squadron to follow in succession, as soon as the leading ship of the lee fleet shall have passed through his line and be ready to go about; by which means he will bring them between two fires. This manœuvre, well executed, might perhaps give no little trouble to the ship attempting to force the line.

This evolution may be performed with advantage, if, by some accident or fault in the manœuvring, the centre division of the weather line be separated from their van or rear. For example, when the centre division to windward is encumbered with disabled ships, then the ships of the centre division of the fleet to leeward, having all sails set, are to tack in succession, and force with promptitude through the weather fleet, leaving their own van division to engage that of the enemy on the other tack.

To prevent the Line being forced.

When the ships of the fleet go about in succession, in order to force the weather line, the whole line to windward is to tack together, and at the same time to get upon the same board as the lee fleet; then that fleet will neither be able to traverse nor join them. To perform this evolution with advantage, it will be requisite to permit some of the van ships of the lee fleet to pass to windward; then the weather fleet must go all about rapidly, in order to put and keep them between two fires: thus may these ships be destroyed without their own fleet being able to give them any effectual assistance.

It is easy to perceive, from what has been said, that there is little occasion to fear being traversed, as such a manœuvre may turn out to be more prejudicial than advantageous to those who perform it. Nevertheless, it may and ought to be put in practice when the weather fleet leave such vacancies between their divisions as to allow some ships of the lee fleet to be inactive. In this case, the ships which are without opponents abreast of them are made to tack, with all sails set, in succession, and pass through these invervals in the weather line, in order to dou-

ble the centre division, or any other part of it, and bring it between two fires.

CHAPTER X.

OF CHASING.

Chasing in the case of Single Ships.

It is scarcely necessary to observe, that the ship which gives chase is usually called the chaser, and that which is pursued is called the chase. Unless the chaser be the fastest sailing vessel of the two, it is generally supposed that she will seldom or never come up with the chase; but we have heard experienced officers say, that a chasing ship, sailing equally fast, in other circumstances, will gain on her chase; because she has an object to steer by, whereas the chase cannot steer so nicely by the compass. In what follows, however, we shall suppose the chaser to be the fastest sailer.

The Chase being to Windward.

When the chase is to windward, it is evident that as soon as she perceives a strange ship which she takes for an enemy, she will haul her wind, in order to prolong the chase, as otherwise her retreat would be soon cut off. The chaser then stands on also nearly close-hauled until he has the chase on his beam; he then tacks, and stands on close-hauled until the chase is again on his beam, and then retacks. In this manner he continues tacking every time he brings the chase perpendicular to his course on either board; and by manœuvring in this manner, it is very certain that the chaser will, by the superiority only of his sailing, join the other in the shortest time. For since the chaser tacks always as soon as the chase is perpendicular to his course, she is then at the shortest distance possible on that board; and since the chaser is supposed to be the fastest sailer, these shortest distances will decrease every time the chaser tacks. It is, therefore, of advantage to the chase to keep constantly on the same course, without losing her time in going about; as tacking cannot be so favourable to her as to her adversary, whose sailing is superior. If the chaser should so little understand his profession as to stand on a long way, and tack in the wake of the chase, the best thing she can do is to heave in stays, and pass to windward of him on the other tack, unless she would have a superiority in going large; for if the chaser persists in tacking in the wake of the other ship, it is an unquestionable fact that the chase will be very much prolonged.

The Chase being to Leeward.

The chase being to leeward, the chaser is to steer that course by which he thinks he will gain most upon her. If, after having run a short time, the chase is found to draw more aft, the chaser is then to bear away a little more; but if the chase draws ahead, the pursuer is to haul up a little, and by this means the course may be so regulated that the chase may always bear on the same point of the compass, and then the chaser will get up with the chase in the shortest time possible; for were any other course steered than that which keeps the chase always on the same point, the chaser would then be either too far ahead, or too far astern; and hence the chase would be prolonged.

The chase ought to run upon that course which will carry her directly from the chaser; and, in general, to consult which is her best trim with respect to the wind, that she may move with the greatest rapidity possible from the ship which pursues her; for some vessels have more advantage in going large than others, some with the wind right aft, and others again are to be found that sail best close-hauled; so that attention should be paid by the officer to the known qualities of his ship, in order to take the most advantageous direction capable to effect a retreat.

Curve of pursuit.

Another method has also been proposed for chasing a ship to leeward, that is, by constantly steering directly for the chase: in this case, the track the pursuer describes through the water is called the line or curve of pursuit. In order to illustrate this, let A (fig. 54.) represent the pursuer, and B the chase directly to leeward of it, and running with less velocity than the pursuer, in the direction BC, perpendicular to that of the wind. Now, to construct this curve, let B*b* be the distance run by the chase in any short interval of time; join A*b*, and make A1 equal to the distance run by the pursuer in the same time. Again, make *bc*, *cd*, *de*, *ef*, &c. each equal to B*b*; join 1*c*, and make 12 equal to A1; join 2*d*, and make 23 equal to A1; in like manner proceed until the two distances carried forward meet as at C, and a curve described through the points A, 1, 2, 3, &c. will represent nearly the curve of pursuit; and the less the interval A1 is taken, the more accurate will the curve be formed. In this particular case the length of the distance BC may be found as follows, provided the distance AB and the proportional velocities of the two ships be known.

Let the velocity of the chase be expressed by a fraction, that of the chaser being unity. Multiply the given distance AB by this fraction, and divide the product by the complement of the square of the same fraction, and the quotient will be the distance run by the chase E. Let AB, the distance of the chase directly to the

leeward of the pursuer, be 12 miles, and the velocity of the chase three-fourths of that of the chaser ; the distance to be run by the chase before she is overtaken is required.

Now $\frac{12\times\frac{3}{4}}{1-\frac{3}{4}|^2}=\frac{9}{\frac{7}{16}}=9\times\frac{16}{7}=20\frac{4}{7}$ miles ; and since the velocity of the pursuer to that of the chase is as 4 to 3 : hence the distance run by the chaser will be $=20\frac{3}{7}\times\frac{4}{3}=27\frac{3}{7}$ miles.

As the pursuer alters his course at every point, and since it is presumed his ship will sail better with the wind in one direction, with respect to her course, than in an another, her velocity will, therefore, be different at different points of the course. Thus, suppose her to sail faster when the wind is upon the quarter, her velocity will constantly increase until she has attained a certain point, and then it will decrease : hence, in real practice this curve will not be precisely the same as above, and of course the measure of BC will differ a little from the preceding determination. The investigation of the foregoing rule is in Simpson's Fluxions, p. 516 ; and the application of the curve of pursuit in Sir George Pococke's engagement in the East Indies in the year 1758, is given in Clerk's Essay on Naval Tactics, p. 160. It must be confessed, however, that Mr. Simpson's investigation, though a pretty specimen of mathematical investigation, proceeds on certain physical assumptions, which are by no means sanctioned by experience. See what has been said of these assumptions and principles in the articles *Resistance of Fluids* and *Seamanship*, p. 84.

Chasing as practised by Fleets.

Hitherto we have considered chasing in the case of single ships only ; the same rules are also applicable to fleets : we shall, however, subjoin the following remarks with respect to chasing as practised by fleets.

If the whole fleet is to give chase, the commander-in-chief will make the proper signal ; and then each ship will instantly make all the sail possible. If the retreating fleet is not much inferior to the other, a few of the fastest sailing vessels only are to be detached from the victorious fleet, in order to pick up any stragglers or those ships which may have fallen astern ; and the remaining part of the fleet will keep in the same line or order of sailing as the retreating fleet, so that they may, if possible, force them to action. But if the retreating fleet is much inferior, the commander-in-chief of the superior fleet will make the signal for a general chase ; and then each ship will immediately crowd all the sail possible after the retreating fleet; or, if the chase be still less numerous, the commander-in-chief will detach one of the squadrons of his fleet, by hoisting the proper signal for that purpose, and he will follow with the remainder of the fleet. The squadron that chases, or the cruisers detached from the fleet, should be very careful not to engage too far in the chase, for fear of being overpowered ; but at the same time to en-

deavour to satisfy themselves as much as may be in their power with regard to the objects of their chase. They must pay great attention to the commander-in-chief's signals at all times; and in order to prevent separation, they should collect themselves before night, especially if there be any appearance of thick or foggy weather coming on, and endeavour to join the fleet again. The ships are deligently to observe when the commander-in-chief makes the signal to give over chase; that each regarding the commander-in-chief's ship as a fixed point, is to work back or make sail into her station, to form the order or line again as expeditiously as the nature of the case and the distance will permit.

Precautions to be observed by the Fleet which is pursued.

When a fleet is obliged to run from an enemy who is in sight, it is usual to draw up the ships in that form or order, called the *order of retreat*, which has been already described; and the commander-in-chief, when hard pursued, without any probability of escaping, ought, if practicable, to run his ships ashore, rather than suffer them to be taken afloat, and thereby transfer additional strength to the enemy. In short, nothing should be neglected that may contribute to the preservation of his fleet, or prevent any part of it from falling into the hands of the conqueror.

PART II.

NEW SYSTEM OF NAVAL TACTICS.

We have now laid before our readers as comprehensive a view as the limits prescribed to such articles will permit of the various evolutions usually practised by fleets in naval war. Though we have transcribed liberally from the most approved writers on the subject, we doubt not but the scientific officer will perceive that we have compiled awkwardly and unskilfully: but we are not seamen ourselves; and the generosity of able officers will pardon the blunders into which mere literary landsmen could hardly avoid falling. The young seaman, who has the noble ambition to excel in his profession, will consult the authors whom we have mentioned in our introduction, in whose works he will find our deficiencies amply supplied; but that the present article may be as complete as we can make it, a view must be given of the system of tactics pro-

posed by the Viscount de Grenier and Mr. Clerk ; because, whether these systems shall ever be adopted or not, they are the offspring of ingenuity, and as such merit attention.

CHAPTER I.

VIEW OF DE GRENIER'S TACTICS.

Defects of the Line of Battle in the old Tactics.

Of all the orders, that of battle is the most important in naval tactics ; but the order of battle which was first formed in the last century by the Duke of York, and has been continued in use to the present day, the Viscount de Grenier thinks extremely defective. Various causes may conspire to render the task of breaking it not difficult. Its great extent must make it no easy matter for the commander-in-chief to judge what orders are proper to be issued to the ships stationed in its extremities ; whilst his signals, however distinctly made, are liable to be mistaken by the commanders of those ships. The extremities of a long line are necessarily defenceless, especially if it be to leeward ; because, after it is formed, the enemy may throw himself with a superior number on its van or rear, and put that squadron to flight before assistance can be sent to it from the other squadrons. These defects the Viscount de Grenier thinks may be remedied by never presenting to the enemy any part of a fleet without its being flanked ; so that were the commander of the adverse fleet to attack those parts which hitherto have been reckoned weakest, he might find himself defeated when he looked for conquest.

Remedied by the Viscount de Grenier.

With this view he proposes a new order of battle ; in which the fleet, composed of three divisions, instead of being drawn up in one line as usual, shall be ranged on the three sides of a regular lozenge, formed by the intersecting of the two close-hauled lines. It is obvious that one of the divisions of a fleet ranged in this manner will always be formed in the order of battle ; whilst the two others, resting upon the first ship ahead and the last astern of that division, will be formed on the close-hauled line opposite, and will stand on checquerwise on the same tack with the ships which are in the line of battle, serving to cover the headmost and sternmost of those ships, and thereby prevent the enemy from penetrating the line or doubling the rear.

Object of de Grenier's Tactics.

Our author thinks it a great mistake, though very generally fallen into, that the weather-gage is of any advantage to a fleet equal in force to its enemy and willing to engage. To him the great art of war at sea appears to consist in drawing or keeping to *windward a part of the adverse fleet*, and collecting all one's forces against that part; and it is chiefly to effect this purpose that he proposes his new system of tactics. The reader, who would understand his principles, must never lose sight of this evident truth, that each ship of a fleet necessarily occupies, at all times, the centre of a horizon; which the author divides into two unequal parts, calling the greater the *direct and graduated space*, and the less the *indirect, crossed, and ungraduated space.* The reason of these appellations is, that on the greater segment of the horizontal circle there are twenty different points, which may be marked by degrees from one of the close-hauled lines to the other, and to which a ship may sail from the centre by so many direct courses without tacking; whereas to the other twelve points, including that from which the wind blows, she cannot arrive but by steering cross courses, which must necessarily delay her progress.

Principles of his system.

Suppose now a fleet to leeward, so disposed as that only a part of it can fight with another equally numerous, and ranged to windward in a single line; and let the lee fleet be ranged on the three sides of a lozenge *a b*, *c d*, *e f*, (fig. 55.) The squadron *a b*, which is most to windward, being drawn up in line of battle, cannot be fought but by an equal number AB of the weather fleet AB, CD, F. All the rest of that fleet, therefore, must remain inactive, unless the ships which are not engaged should try to pass to leeward of the fleet, *a b*, *c d*, *e f*. But should the ships of the weather fleet, which are placed between B and F, bear away as they appear in the figure between C *i* and F *i*, it is evident that the ships between A and B, which are fighting to windward, cannot bear away with them. Suppose now that, after the ships between C *i* and F *i* have passed to leeward, the squadrons *c d*, *e f*, which are ranged according to the new system, and have not yet been engaged, should come to windward and join with their friends *a b* against that squadron of the enemy A B which is still to windward and engaged; it seems almost inevitable but that the squadron AB must be destroyed by so great a superiority, before it could receive any assistance from the ships to leeward between C *i* and F *i*. No doubt those ships would endeavour to succour their friends; but with respect to them, the squadron AB must be considered as placed in that part of the horizon which our author calls *crossed and indirect*, and to which they would not be able to repair but by steering alternately the two close-hauled lines; and assist-

ance brought by so tedious a course would come too late to be of essential service. It is from this apparently well supported conclusion that the Viscount de Grenier deduces the propriety of his proposed orders of sailing and order of battle.

First Order of Sailing.

Of orders of sailing, he thinks, there can be no occasion for more than three ; one, when a fleet is to pass a strait ; another, when it steers in an open sea, either looking for the enemy or trying to avoid him ; and the third, when it has an extensive cruise to perform, in which the ships should be so disposed as not to be surprised or cut off by the enemy. His first order of sailing differs not from that in common use. It is and must be observed, says he, in any narrow road, whatever may be the occasion of its narrowness, whether rocks or sands.

Second Order.

In the second order of sailing, when the fleet is looking for the enemy or trying to avoid him, the columns *a b*, *c d*, *e f*, are to be formed on three sides of a regular lozenge, and ranged on the two close-hauled lines. The ships of the two divisions *c d*, *e f*, sometimes to windward (as in fig. 56.) and sometimes to leeward (as in fig. 57.) of the third division *a b*, are to be formed on two parallels of one of the close-hauled lines in the wakes of their respective headmost ships ; and the third division *a b* is to be ranged ahead or astern of the two others on the other close-hauled line, and nevertheless to steer chequerwise the same course as the two divisions *c d* and *e f*. When *a b* is to windward of *e d* and *e f* (fig. 57.) the Viscount calls that the *primitive* windward order of sailing ; and when to leeward (fig. 56.) the fleet is in the *leeward primitive* order of sailing. The position of the three divisions in the windward primitive order of sailing is the same for the order of battle natural ; for the order of retreat ; and for the order of circumvallation, when the object is to separate from the hostile fleet a part of its ships in order to engage the remainder with more advantage. The position of the three divisions in the leeward primitive order of sailing is also the same for the order of battle inverted ; for the order of chasing ; and for the order of convoy ; so that in no possible case, when looking for the enemy or wishing to avoid him, need the commander-in-chief perplex himself with more than these two positions on the one or the other tack, whatever movements he may wish the fleet to make.

Third Order.

In the third order of sailing, the divisions *c d* and *e f*, instead of bearing on the headmost and sternmost ships of the division *a b*,

may be very conveniently placed at considerable distances from that division, without the smallest danger of being surprised by the enemy, provided the ships of each of the divisions keep always their respective positions in the two lines of bearing. For if we suppose the three divisions to be in such positions that *a b* and *e f* are at the distance of six leagues from each other (fig. 58.) and that the two divisions *c d* and *e f* rest on the extremities of the base of the triangle STV, while the centre ship of the division *a b* rests on its summit T ; none of the divisions could be cut off by an enemy, however formidable, seen from its centre ship at the distance of six leagues. For if, upon the proper signal being thrown out, the division *a b* should steer from T towards X, on the course opposite to the close-hauled line it steered before, and the two divisions *c d* and *e f* steer from V and S towards X likewise ; it is plain that each of these three divisions would have only three leagues to run in order to join the other two in the windward primitive order of sailing, which is the same with the order of battle natural ; whilst the enemy, which was first perceived at the distance of six leagues, must necessarily run nine before he could come up with the nearest of these squadrons. And if frigates were placed ahead, and in the intervals between the divisions, at the points *y y y* to windward and leeward of the fleet, the enemy might be seen at a still greater distance, and the danger of surprise be still so much less.

Order of Battle.

We have said, that the position of the three divisions in the primitive orders of sailing is the same with our author's proposed order of battle ; but there is this difference between them, that in the order of battle only the ships of one of the three divisions stand in the wakes of one of another, and that those of the two other divisions are ranged on two parallel lines, and steer chequerwise. So that if it be wanted to change a fleet from the windward primitive order of sailing to this new order of battle on the other tack, the movement will be infinitely quicker than those which, in former known tactics, are commonly prescribed, to pass from all the orders of sailing either in one line, or on the obtuse angle of chasing or retreating, or in three or six divisions, to the usual order of battle. For it will be sufficient for the ships of the three divisions, ranged in the windward primitive order of sailing, to heave in stays all together, and get on the other tack in the opposite line of bearing, and they will instantly find themselves in this new proposed order of battle (fig. 59.) ; and should the fleet be in the leeward primitive order of sailing, it would be sufficient for the ships of the three divisions all together to haul their wind on the same tack as they steer, and they would find themselves in order of battle (fig. 60.)

Natural and Inverted.

When the two columns *c d*, *e f*, are to leeward of the third division *a b*, ranged in order of battle, our author calls *that* the order of battle *natural;* and when *c d* and *e f* are to windward of *a b*, the fleet is in the order of battle *inverted.* The former of these orders is calculated for a fleet combating to leeward, and the latter for a fleet which must combat to windward.

Advantages of these orders of Sailing and of Battle.

That we may form some notion of the advantages which our author expects from drawing up a fleet for battle in the form of a lozenge, let us suppose the line AB, CD, EF, (fig. 61.) to represent the fleet of an enemy to windward in the ordinary order of battle on the close-hauled line of bearing, and on the starboard tack. Then the leeward line *a b* will represent one of the divisions, in order of battle on the starboard tack, of the fleet ranged according to the new natural order, which the enemy wishes to attack, and to which he believes himself superior, because that division offers a front much inferior to his own. The two lines *c d*, *e f*, will represent the two other divisions standing on checquerwise on the same tack as the line of battle, and formed on the opposite close-hauled line. On this supposition, if the divisions AB, EF, of the hostile fleet, which have it not in their power to attack the ships of the line *a b*, wish to fall on the headmost ship *a* or the sternmost *b* of that line, they will be obliged to bear away in order to attack the two ships *a* and *b*. To prevent this, each of the divisions *c d*, *e f*, of the fleet ranged according to the new order, should make the following evolutions, according to their respective situations and to the manœuvres of the enemy.

Evolutions to be performed when Engaging.

1st. The ships of the division *a b* are to slacken as much as possible their headway, and form a very close line, till the enemy makes a movement to attack the headmost or sternmost ship of that division.

2dly. The ships of the division *c d* are to make sail till they come under the second or third ship of the rear of the line of battle *a b*, when they will take the same sail as the ships of that division, to preserve that position until the hostile ships make their evolution to attack the rear ships of that division. In this situation the ships of the division *c d* will be able to observe the manœuvres of the enemy, in order to change tack and form themselves in order of battle on the opposite board as soon as the hostile ships shall have, after bearing away, run over a certain space: because the ships of the division *c d*, steering afterwards close-

hauled in the wake of the sternmost ship of the division, *a b*, will be able to cover the rear ships of that division, and get the weather-gage of the hostile divisions which are bearing away ; rake their ships ; run alongside of them ; double their rear-guard, and put it between two fires, if those hostile ships are following in the wake of each other ;* divide it if they bear away checquerwise, or gain to windward, and put between two fires the enemy's division CD, while it is engaged with the division *a b*.

3dly. The ships of the division *e f* may abandon their post and run checquerwise under a press of sail, in the same course and in the same order they were formed, as soon as they perceive that the enemy falls ahead of the division *a b* ; in order that if the division AB of that enemy makes any manœuvre to bear away and fall on the division *e f*, or on the van of the division *a b*, they may, by going about, steer in order of battle close-hauled on the opposite line of bearing, and cover the headmost ship of the division *a b*, double the hostile division CD ahead, or divide the other hostile division AB, which is running checquerwise on the opposite tack.

When the Enemy is in a Single Line not well formed.

The two divisions *c d*, *e f*, might again manœuvre another way, in case the ships of the enemy were ranged in one single line not well formed, or should be in disorder and leave too great a distance between them while they are engaged very close with the division *a b* (fig. 62.)

1st. By putting about the ships of the division *e f*, and likewise the ship *a* headmost of the division *a b*. 2dly. By making at the same time the ships of the division *c d* tack, and likewise the ship *b* of the division *a b*, to keep by the wind on the opposite close-hauled line. 3dly. By making all the ships of the division *a b* (which stood between the headmost *a* and the sternmost *b*) bear away four points at the same time, and making them also take the same tack as the ships of the other two divisions when they are on the beam of the sternmost ships of those two divisions, because in that position the ships of the two divisions *c d*, *e f*, getting to windward on two parallels in order of battle, in the wake of the two headmost *a* and *b*, might put between two fires a part of the enemy's ships, which then would be obliged to take the same tack as these two divisions, because the ships of the division *a b* (which are on the same tack as those two divisions)

* If the hostile ships which are not engaged with any of those of the division *a b* bear away in succession in the wake of their headmost, in order to pass to leeward of the division *a b*, and to put it between two fires ; then the ships of the division *e f* must necessarily take the weather-gage of them, since the headmost of that division *e f* is by her very situation already to windward of the headmost of the adverse ships which are bearing away, and she has the opportunity to come as close as possible to the sternmost ship *b* of the line of battle *a b*.

might prevent the ships of the enemy steering the course opposite to that tack.

From this succinct exposition it may be observed, that, in the first supposition, the way of thus disposing the forces of a fleet is so much the more suitable to the defence of the headmost and sternmost ships of a line of battle, as the ships of the division *c d*, being covered by that line of battle, are able to manœuvre without any one ship of that division being exposed to the fire of the enemy; that the division *e f*, the headmost ship of which is *e*, always presents the side to the enemy, without any one ship of that division being exposed to receive the fire of the enemy either ahead or astern, because they are not to range in a line of battle unless the enemy runs large or before the wind; and that, in the second supposition, the only ships which are liable to be raked astern, while they change tack, are the headmost and sternmost of the division in line of battle which cover the ships of the other two divisions.

How to know on what tack the Fleet must be Formed.

As it is of the utmost advantage to know, at first sight of the enemy, whether it be to windward or leeward of the fleet ranged lozenge-like, on what tack, and on what side the fleet must be formed, in order to defend itself or attack the enemy with advantage, it is to be observed, that in both the windward and leeward primitive orders of sailing the direction of the wind always traverses both the weathermost and leewardmost ships of the fleet, (figs. 57 and 56.); that this leewardmost ship is always placed in the centre of an horizon, which is to be considered as the horizon of the whole fleet; and that it is from that ship you are to judge, by means of the rules which are known and practised in such cases, whether the lozenge-like fleet be to windward or to leeward of that of the enemy.

If you want to know, at sight of the enemy, seen either to windward or to leeward, on what side the line of battle is to be formed in order to be able to send one of the divisions on that side of the lozenge where there is none, it is the position of the enemy, with respect to the direction of the wind, which is to determine it; because, if the enemy is to windward of the fleet ranged in the windward primitive order of sailing, and if it bears down on that fleet, with the wind large or right aft, it belongs to its weathermost ship to observe what follows. If that ship, by setting the enemy, finds him to starboard of the direction of the wind, the division which is starboard of that direction of the wind is to take the starboard tack, and range in order of battle before the enemy is arrived within gunshot; if, on the contrary, the above-mentioned ship finds the enemy to larboard, it belongs to the larboard division to assume the order of battle, and to take that tack, before the enemy can come to action. The old rule for choosing the

proper tack is to be observed by a fleet in the leeward primitive order of sailing; observing, that it is the business of that fleet's leewardmost ship to determine it; and the point of the horizon which is opposite to that whence the wind blows, is the point towards which the observer is to be turned to judge on what side, whether starboard or larboard, the line of battle is to be formed; because, in that position the starboard side must always be on his right hand and the larboard on his left.

By following this general rule, the line of battle will never be exposed to be too much lengthened either to windward or to leeward, in order to oppose all the ships of the adverse fleet formed in one single line, nor even to be surprised in disorder by that fleet while you are forming in orders of battle natural or inverted.

The orders of Chasing, Retreat, and Convoy.

Our author's orders of Chasing, of Retreat, and of Convoy, are very easily formed. We have already said what they are; and the seaman, or even the landsman, who has any tolerable conception of his orders of sailing and of battle, will not stand in need of any farther description of them. It must, however, be observed, that in the order of chasing, the fleet in the lozenge-like position presents the obtuse angle of chasing, as when ranged according to the ordinary tactics; with this difference, that, in order to form themselves in order of battle, it is enough that, in this lozenge-like position, the ships of the second division should all keep the wind on the same board they were standing on, because they would afterwards find themselves in a line in the wake one of another; but, according to the usual tactics, the ships have a long space to run before they can execute the same evolution.

How the Commander-in-chief's Ship, the Frigates, and Transports, are to be placed.

We shall conclude this short view of the Viscount de Grenier's tactics, with his directions for the most advantageous placing of the commander-in-chief's ship, the frigates, and transports, belonging to a lozenge-like fleet, whether it be ranged in the order of sailing or of battle, &c.

In the order of sailing, the commander-in-chief A is to be placed ahead of the fleet, at a short distance from the headmost of the second division, and in the direction of the wind with the headmost of the first division (fig. 63.) Two of the frigates *f f* are to observe the same rule and the same position, with respect to the van ship of the third division and the sternmost of the first. In the order of battle, on the contrary, the commander-in-chief is to be in the centre of the lozenge, and two of the frigates on the fourth side of the lozenge, (fig. 64.) As for the transports and

store-ships, when there are any, their station is to be in one line on the side opposite to that of the enemy, when ranged in order of battle; and, if in order of sailing or convoy, they may occupy the space circumscribed by the lozenge. In any other circumstances these ships are to occupy the different stations appointed for them, that they may distinguish the signals and execute the commands of the commander-in-chief. Lastly, when the fleet shall pass from the order of battle to any other order whatever, or from any order to the order of battle, the commander-in-chief's ship is to bring to, and not to take any of the positions above mentioned till after the complete execution of the movement.

CHAPTER II.

VIEW OF MR. CLERK'S TACTICS.

Whether the Viscount de Grenier's order of battle and of sailing would be attended with all the advantages which he hopes from them, experienced seamen alone can judge; but we are now to introduce to our readers part of a system which has met with very great approbation from some of the ablest officers in the British navy, and which to us appears to be founded on principles self-evident. Mr. Clerk, in the introduction to his Essay, informs us, that upon considering the great superiority displayed in the three last wars by the British seamen over their enemies, when engaged in single ships, and comparing it with the very little that, previous to Lord Rodney's glorious action, they had achieved when engaged in fleets drawn up in line of battle, he was led to conclude, that there must be something wrong in the mode of making the attack. He turned his thoughts to the subject, and in 1790 published part of a large work, comprehending, 1. *A Theory of Attack from Windward;* 2. *A Theory of Attack from Leeward; and* 3. *An Historical Sketch of Naval Tactics.* We think it not much to the honour of his countrymen, that he has not yet had encouragement to publish more than the first part; but in hopes of exciting curiosity, we shall lay before our readers a distinct view of that part, beginning, as he begins, with

OBSERVATIONS ON THE PRESENT METHOD OF BRINGING SHIPS TO ACTION.

Disadvantages of Bearing down directly on the Enemy.

It has often, if not generally, been the practice, in the case of single ships, as well as in that of fleets, for the weather ship or

fleet, when it is wished to bring the other to action, to steer directly down upon that ship or fleet, without reflecting that, by doing so, it gives the enemy an opportunity of completely disabling it, before it can attain its wished-for station. For each ship in the lee line can use all the guns upon one side ; whereas the ships in the weather line, bearing directly down, have it only in their power to use their bow-chases. This method of attack appears, therefore, to be the worst possible for the weather fleet, and the most advantageous for the lee fleet. For suppose a single ship of 80 guns to windward at B (fig. 65.) discovering an enemy's ship of equal force to leeward at F, to bear directly down upon her endwise, the receiving ship F, by lying to as in fig. 66. would present a broadside of 40 heavy guns bearing upon B, during a course of two miles, in which every shot might take effect ; while B, in this position, would have it in her power to bring only the two light guns of her forecastle or bow-chase to bear on F ; a disadvantage greatly exceeding twenty to one. Besides, the receiving ship F, by lying broadside to, will have all her masts and rigging more open, and consequently will allow shot to pass with less effect than the ship B, which, coming endwise, is liable to be raked by every shot from stem to stern. The consequence of which must be, that B would be disabled in her rigging, &c. long before she could arrive at a proper position for annoying F ; and when she had attained that position, F, by being entire in her rigging, would have it in her power to fight in any position, or to make off at pleasure.

Proper method of Attack.

The method then is, B having the wind, should run down astern as per dotted line, and getting into the course, or near the wake of F, or a position that will bring her parallel to the course of F, at a proper distance, she should then run up close along side of F, upon equal terms, as in fig. 67 ; or otherwise, on shooting ahead, she may veer, and run down on the weather bow of F, as in fig 68. till she shall force F to bear away to leeward, keeping close by F on equal terms ; but during the course, in both cases, carefully watching that F may not have it in her power to bring her broadside to bear upon B without retaliation.

Modes of Attack by the British and French.

It having been often said, that the French have made it a rule to throw the whole effect of their shot more particularly into the rigging of their enemy, and that the British, on the other hand, have been as attentive to point the force of their fire against the hull of the ship ; it may be proper here to state the two cases, and compare the effect.

Let us suppose a ship of 80 guns wishing to avoid the effects of a close engagement, but at the same time lying to as at F (fig. 63.) intending to receive, with every advantage, an enemy B of equal force, coming down with an intention to fight her; and let us suppose that F, by aiming her fire at the rigging of B, shall have carried away any of the principal stays, eight or ten windward shrouds, or a fore-topmast, or any other rigging, though of much less consequence, but, at the same time, without having wounded a single man of the ship B; and suppose a second ship, consort to F, receiving such another ship as B, and by firing at her hull only, shall, without other damage, have killed 30 or 40 of her men. In this critical juncture, when F and her consort are desirous of avoiding a close engagement, it is evident that the ship at B, which has lost part of her rigging, is more completely disabled from closing with them than the other ship, whose rigging is entire, though she may have lost 100 of her men.

No ship in the line of battle can be exposed to the fire of many at once.

It has been often said, that some particular ship has been exposed in battle to the cannonade of three, four, or even five ships, all extended in the enemy's line, and all bearing upon her at one and the same time; but this can never have been the case, but when the ship so exposed was at a very great distance. Let I, H, F, H, I, (fig. 70.) represent five ships extended in line of battle ahead at the distance of one cable's length, or 240 yards, from each other; let the length of each ship be 40 yards, so that the whole space between head and head of any two adjacent ships is 280 yards; and let the perpendicular line F K. proceeding right out from the beam of the middle ship F, to the distance of six cables' length or 1440 yards, be divided into six equal parts. It is evident, from inspection, that a ship stationed at the point E of the line FK, 720 yards distant, cannot for any length of time be exposed to the fire of more than the centre ship F of the fleet I, H, F, H, I. For supposing the ships H, K, ahead and astern of F, to be able to bring their broadsides to bear on E (a supposition which, if the line be close-hauled, cannot be made of the headmost of those ships) it is evident, that by putting themselves in positions proper for that purpose, the ships H, H, will not only disorder their own line, but also leave, the one her head, and the other her stern, exposed to a raking fire from their opposites B, B, in the enemy's line.

But if the opponent ship cannot well be exposed to the fire of the two ships H, H, at the point E, she must be still less exposed at the point C, 480 yards distant; and it will be almost impossible for the ships H, H, to touch her at the point G, 240 yards, or one cable's length, distant.

But one cable's length asunder is two small an allowance for accidents that may happen by the ships, I, H, F, I, extended in line of battle ahead. Therefore, let us suppose the three ships, which are said to be at once upon a single opponent, to be stationed at I, F, I, at the distance of two cables' length of 480 yards from each other. Then it is evident, that the opponent ship cannot now be more exposed at the point K, at the distance of 1440 yards, than she was, on the former supposition, at the point E, 720 yards distant; and if we suppose the line of battle to be formed at one and a half cable's length asunder, she must be at L, distant 1080 yards before she can be annoyed even to this degree by the three hostile ships at once. Hence we may fairly conclude, that if one ship has at any time been exposed at once to the fire of five, four, or even three ships of the enemy's line, such ship must have been at a very great distance, and in no great danger.

Principles necessary for bringing Fleets to Action.

Having finished the above observations, our author proceeds to the principles necessary to be known for enabling us to judge of the different modes of bringing great fleets to action. For this purpose he supposes a fleet of ten, twenty, or more ships, of 80 guns each, extended in line of battle, to leeward, and lying to at F (fig. 71.) with the intention of avoiding an attack; whilst another fleet at B, of equal number and force of ships, also extended in line of battle three or four miles to windward, is desirous of making an attack, and coming to close action on equal terms with the fleet F. In this disposition of the two fleets, should that to windward run down headlong, ship for ship, on its opponent, as in figs. 66 and 69. it is evident, from what has been said in the beginning of this chapter, that each individual ship of the weather fleet might be completely disabled before it could possibly come to close action with the fleet to leeward. But let it be supposed that the commander of the weather fleet B, though his ships have been much disabled in their rigging during their course *a a a* from windward (fig. 72.) has made them bring to at a great distance from whence he can hurt F; is it to be expected that F, whose desire has always been to avoid a close engagement, and who has already disabled the ships of B, will patiently lie still, or wait until B shall have time to disable him in his turn? No, surely. While enveloped in his own smoke, as well as that of his enemy, he will bear away unhurt to a new station G, and there remain out of the reach of B's cannon shot, who must repair his rigging before he can attempt a second attack.

Again, suppose that B, in place of going headlong and endwise down, were to run down in an angular course, or *lasking* as it has been called; it is evident from fig. 73. that should any ship in this angular line come to be crippled, her way being stopped, might of consequence occasion a confusion among the ships next astern to

her, some running to leeward and others to windward of the disabled ship: and thus the time be lost for affording the necessary support to the ships ahead, and now so far separated from their companions. Should it be said, that a stoppage of one ship ahead will not necessarily produce a stoppage of every ship astern, because they may go to leeward of the disabled ship; we answer, that the ships ahead in the van A (fig. 74 No. 1.) may be now engaged, and of consequence not having much headway, may be said to be stationary; therefore, every ship astern, if she shall attempt to bear down, as at D, D, from being confined to a determined course, must be brought into the position of being raked when coming down before the wind, as in figs. 76. and 69. and consequently of being completely disabled long before she can get close enough alongside of the enemy.

Again, the headmost ships, or van of B, having attained their station at A, that is, abreast of the van of F (fig. 74 No. 1.) and having begun the cannonade, may we not suppose that F, whose conduct or desire has always been to save his ships, has instructed the commanders of those in the van of his fleet to withdraw from danger as soon as they begin to feel the effects of a cannonade? and if so, may not those ships, as soon as they have thrown in their fire upon the van of B, bear away in succession as at H, followed indeed by the whole ships of F's fleet, which, having poured in their fire upon the van of B, may form a new line of battle two or three miles to leeward at I I (fig. 74 No. 2.) and there be in readiness to receive a second attack, if B shall be so imprudent as to attempt it? And is it not farther evident, that if any one or more ships of the squadron of F shall be crippled, they will have it in their power to quit their station, being covered with smoke, at any time, and to fall to leeward as at G, where they will be in safety?

In order to illustrate this still farther, let B (fig. 75) represent a fleet putting before the wind, each ship with an intent, when brought to at a determined distance at A, to take up her particular antagonist in the line of the enemy F to leeward; and, for argument's sake, let F be supposed at rest, without any motion ahead. There seems to be no difficulty in conceiving, that while the alternate ships of F's line, under cover of the smoke, withdraw from battle to GGG, the intermediate ships left behind them in the line will be sufficient to amuse even the whole of B's fleet, till the ships G shall form a new line HH as a support from the leeward. In such case B, after being disabled, as he must be, and not having foreseen the manœuvre, will neither be able to prevent the intermediate ships with which he is engaged from bearing away to join their friends, nor, were he able, would it be adviseable to follow them; for the same manœuvre with equal success can again and again be repeated.

In order to show the relative motion of both fleets, let F (fig. 76.) be a fleet consisting of twelve ships, drawn up in line of bat-

tle, at one cable's length or 120 fathoms asunder; and let the length of each ship from the end of the jib-boom to the stern be $36\frac{2}{3}$d fathoms; the whole fleet will then occupy a space of two English miles; also, let its rate of sailing be four knots an hour in the direction FG, so that in the space of an hour it may have moved from F to G, four miles distant from its former position.

Let B be the opponent fleet, consisting also of twelve ships, and four miles to windward; and let the point A be 440 yards, or one quarter of a mile, right to windward of the point G. Then if B, by bearing away in the direction BA, shall arrive at the point A at the same instant that F, the fleet to leeward, has arrived at the point G, the motion of the fleet B will have been at the rate of $5\frac{1}{2}$ miles nearly per hour; and the angle contained between the direction of its line of bearing and present course 43° 9′, or nearly 4 points. For in the right-angled triangle ABM are given BM=4 miles, and AM=$3\frac{3}{4}$ miles.

Now BM=4 m. : AM=$3\frac{3}{4}$ m. : : R : tan. ABM=43° 9′, and R : sec. ABM. 43° 9′ : : BM=4 m. : AB=5.483 m.

Again, if F, as in fig. 77. by carrying more sail, shall move at the rate of six miles an hour, that is, from F to G; then B, having his course made thereby the more slanting, will have just so much the greater difficulty of keeping his ships in line abreast while coming down to the attack; for the leading ship meeting with no obstruction in her course, will push on; whereas every accident of obstruction accumulating, as it happens to each ship progressively, the rear, being affected in the greatest degree, will for that reason be left the farther astern. But, from the very form of this slanting course, every ship astern will be apt to get into the wake of the ship ahead. Therefore, the whole fleet of B, van and rear, will not arrive in the same time at the line AD, so as to be in a perfect line abreast, and parallel with the fleet to leeward; but will have assumed the lasking form, as represented at the points M, N, and O, in the different parts of the course. In this case, the distance run by the van of B, from B to A, is 7,075 miles, or 7 miles and 132 yards, and the angle contained between the line of bearing and the distance BA is 32° 0′.

And again, as in fig. 78. if the fleet to leeward shall lie up one point higher, as FG, then the rears of the two fleets will thereby be removed at a much greater distance, and the van A of consequence must be sooner up with the enemy's van, and evidently so much the farther from support; while F, by bringing up his ships in succession, will have it in his power to disable the van of A, and will afterwards bear away, as at H, unhurt and at pleasure; while B, at this time, by the supposition, being crippled, or having his rear D obstructed, and at a distance, will be unable to prevent him. And in all the three cases, it is evident that the fleet B, so soon as he shall approach within reach of gun-shot, must be exposed to the fire of F's whole line; for he will be abreast of B

continually in every part of his course. But the difficulty of bringing the rear of the windward fleet to action will still be more increased, if the sternmost ships of the fleet to leeward, in place of keeping their wind, shall bear away occasionally as at ML. All which being admitted, the difficulty of bringing adverse fleets to close engagement may be accounted for, without being obliged to have recourse to that supposed inferiority in point of sailing, imputed to British ships, compared to those of the French.

Hence it appears, that a fleet B to windward, by extending his line of battle, with a design to stop and attack a whole line of enemy's ships to leeward, must do it at a great disadvantage, and without hope of success ; for the receiving fleet F to leeward unquestionably will have the four following advantages over him :— 1. The superiority of a fire above 2 to 1 over the fleet B, while coming down to attack. 2. That when the ships of B are brought to at their respective station, if it blows hard, the shot from F, by the lying along of the ships, will be thrown up into the air, and will have an effect at a much greater distance ; whereas, on the other hand, the shot from B, from the same cause, will be thrown into the water, and the effect lost. 3. That F, will have the power of directing and applying at pleasure the fire of his whole line against the van of B, who is now unable to prevent it, his ships being disabled, separated, and therefore unsupported. 4. That F will also have a greater facility of withdrawing from battle the whole or any one of the disabled ships of his line.

If then, after a proper examination of the late* sea engagements or rencounters, it shall be found that the French commander-in-chiefs have never once shown a willingness to risk the making of the attack, but invariably have made choice of and earnestly courted, a leeward position ; if invariably, upon seeing the British fleet disabled, they have made sail, and demolished the van in passing ; if invariably, upon feeling the effect of the British fire, they have withdrawn at pleasure either a part or the whole of their fleet, and have formed a new line of battle to leeward; if the French repeatedly have done this upon every occasion :—and, on the other hand, if it shall be found that the British, from an irresistible desire of making the attack as constantly and uniformly have courted the windward position ; if, uniformly and repeatedly, they have had their ships so disabled and separated, by making the attack, that they have not once been able to bring them to close with, to follow up, or even to detain one ship of the enemy for a moment—shall we not have reason to believe, that the French have adopted and put in execution some system which,

* This was written during the American war, and before Lord Rodney's decisive victory on the 12th of April, 1782. That action, as well as the still more brilliant one of Lord Howe on the 1st of June, 1794, we have heard the author distinguish from those battles which, with great propriety, he calls 'sea rencounters,' and do ample justice to the scientific manœuvres of both the noble admirals.

if the British have discovered, they have not yet profited by the discovery ?

Our author therefore, instead of the usual mode of attack, which, by being made principally on the van, seems to be the result of a groundless expectation of being able to *take*, *destroy*, or *disable* the whole of the enemy's line, proposes

A NEW MODE OF ATTACK FROM THE WINDWARD UPON THE REAR OF THE ENEMY.

Mr. Clerk's mode of Attack upon the Rear of the Enemy.

Suppose, says he, a fleet of ten, twenty, or more ships, extended in line of battle at F (fig. 79.) endeavouring to avoid a close engagement, but at the same time keeping under an easy sail, with the intention of receiving the usual attack from another fleet of equal number, three or four miles to windward at B, sailing in any form, but let it be in three lines or divisions ; it is required by what method shall B make the attack on F with advantage ?

The improbability, or rather impossibility of attacking and carrying the enemy's whole line of ships, having been demonstrated by every action which has been fought at sea, the next consideration will be, how many ships may be attacked and carried with advantage ? Let it be supposed that the three sternmost ships only, and not exceeding the fourth, are possible to be *carried ;* let a sufficient strength A be sent down to force an attack upon these three ships, disposed and supported according to the judgment of the commander-in-chief, while in the mean time he keeps to windward with the rest of his fleet, formed into such divisions as may best enable him to attend to the motions of the enemy and the effect of his attack ; being himself so far disengaged from action, as to be able to make his observations, and give his orders, with some degree of tranquillity.

By placing the fleet B in such divisions as represented in the figure, when the attacking squadron comes up with the rear of the enemy, the whole will be so disposed, and so connected together, as to be able to give the support and attention that may be required to any ship, or any part of the fleet, and in preference to a long extended line of six or seven miles in length, where it must be impracticable to give the necessary support to such ships as may be disabled.

Attack upon the enemy's three Sternmost Ships more particularly considered.

The ships of the fleet F may, in general, be better sailers than the ships of the fleet B ; but it is not conceivable but that the

swiftest ships of B must come up alongside of the sternmost and dullest sailing ships of the enemy F ; while, at the same time, F, by attempting to outsail B, must be thrown into the disorder of a downright flight : therefore, of course, it must be admitted, that if the enemy F continues going off in line of battle, and endeavouring to avoid a close engagement, it will be impossible to prevent the fleet making the attack from getting into the position BA. But by this position, it is evident that the three ships at I of the fleet F will be in the power of the commander-in-chief of B ; for, by keeping so many ships to windward, he will be enabled to send down fresh ships from time to time, either for the support, or to supply the station, of any of those that may be disabled in making the attack, while it may be imagined that the three ships in question, by being disabled, or being deprived of the wind now taken out of their sails by the ships to windward, will be prevented from following their friends. Hence the enemy ahead must either abandon his three sternmost ships, or he must double back to support them ; which must be done either by tacking or veering.—But let it be first examined what is naturally to be done by tacking ; and for the greater satisfaction, let every possible case that can happen be examined separately.

The enemy's attempt to Support his three Sternmost Ships by Tacking his Fleet.

First, let us suppose that the enemy at F, (fig. 80.) has continued to protract his course in line of battle upon the same tack, and that the headmost ship H, with the three next astern of her, have tacked to windward, and that the whole remaining ships intend to tack the same way, but in succession ; is it not evident that F has then left his three sternmost ships at I in the power of the ships at A ; that he must also leave exposed his fourth and fifth ship G to another attack from another division of B at C, which will also be on equal terms as with his three sternmost at I ; and lastly, if he prosecutes his intention of supporting his three ships, he will be obliged to begin a disadvantageous attack upon the commander-in-chief, with the main body of the fleet lying ready to receive him ? The consequence of all which must be, that he will not only lose his three sternmost ships, but in all probability the fourth and fifth also, as at G ; and will be forced to begin an attack, and close and mix ship with ship on equal terms ; a situation which he at all times, with the greatest anxiety, hath avoided, and which B with equal anxiety has always courted.

Again, suppose that his three sternmost ships have been attacked, and that he has ordered his fleet to tack all at one time, as in fig. 81. The consequences will then be, that this movement, having required some time and some length of course, will have produced a considerable distance between his main body and his

three ships; or, in other words, that these three ships have been deserted: for it will not be in their power to tack with the rest of their friends. He must, also, in bringing his ships' heads round, expose the ships nearest his enemy to be raked by a dreadful cannonade; besides running the risk of having his fleet thrown into a general disorder, by many of his ships missing stays, veering, and running to leeward. Lastly, upon a supposition that his ships have all tacked, and none of them missed stays, still he must of necessity begin the attack, mix his ships, and come to a close engagement, as in the former case.

The enemy's attempt to Support his three Sternmost Ships by Veering his Fleet.

Having shown the consequences of an attempt to succour the three sternmost ships by tacking, let us also examine what may be expected from an attempt to do it by veering the fleet. Suppose the two fleets in the same position as in fig. 79.—that is, the main body of the enemy extended in line of battle to leeward, his three sternmost ships entangled with the fleet B, whose commander-in-chief, with the main body, keeps to windward to observe, with a rigid attention, the motions of the enemy. At the same time suppose that the commander-in-chief F has ordered his sternmost ship G to veer (fig. 82.) and afterwards the whole line; and that he is now running upon a contrary tack to leeward, as at H, wishing to support or bring off his three ships. From inspection, it will be evident that this attempt may be more dangerous than the attempt to windward; for it will expose a number of his ships to a raking fire while in the act of veering; and the squadron, by getting so far to leeward, will be unable to give the proper support to the three ships. It will open a gap for the fleet of B (who will immediately veer also and follow him) to break in, as at A, and cut off the three ships without hope of recovery. And if F shall still persist in the endeavour to recover his three ships, he will be obliged to begin the attack under all the usual disadvantages.

Again, upon another supposition, that the headmost ship of the enemy H (fig. 83.) with the four or five next astern, have wore, and are running upon a contrary tack, wishing, as before, to support or bring off the three ships, the rest of the fleet intending to wear also, and follow in succession; it is evident that this movement, being more unseaman-like, will be worse than the last: it will expose an additional number of ships, particularly the last two, as at G; and will at the same time make an opening for the main body of B's fleet to fall in and cut off the three ships, as in the former case.

Again, should the enemy F veer and bear away with his whole ships at one and the same time, it is evident that this movement

must have the consequence of a downright flight, with the certainty of losing the three ships.

From what has been said, it will appear, that a fleet B, keeping connected in a body to windward, may come up with and entangle the three sternmost ships of an enemy F, extended in line of battle and going off to leeward, and at the same time be able to overawe the remaining main body of their fleet; and that, having forced the position, the whole consequences, as already described, must follow; that is, F must submit to the loss of three ships.

What has been hitherto said, proceeds upon a supposition that the fleet F has kept on his course till the fleet B has come up with his rear. Let it then be examined what other attempts the enemy F can make to avoid coming to close engagement upon equal terms.

The enemy endeavouring to Avoid the Attack upon his Rear by Veering and passing on contrary tacks to Leeward.

Suppose a fleet of ships of the enemy standing on the larboard tack to leeward, and going off as before at F, and a fleet of ships in a collected state or position to windward, as at B (fig. 79.); and suppose that the enemy F, perceiving the fleet B pointing an attack against his rear, in place of keeping on his course upon the same tack, should veer, and endeavour to pass on contrary tacks to leeward (for it will not be admitted that he can get to windward); what will then be the effect?

Is it not evident, that the headmost ships of F must be forced to leeward by the fleet B obstructing his line of direction, or the line of his course; that they must be forced to begin an attack at any distance B may choose? that they may receive such damage as will stop their way? that their way being stopped, will of course be an obstruction to the next astern; or that these subsequent ships, to prevent this stop, must bear away to leeward of their crippled ships, as at G (fig. 84.) which will not only prevent these ships from damaging the headmost ships of B, but will give time and opportunity to B to bring down his windward ships to fall in either ahead or astern, that is, to the right or left of his headmost ships A, and oppose ship for ship of the enemy upon equal terms? But should none of the headmost ships of the squadron F be crippled, that is, should F pass B without reach of cannon-shot, which undoubtedly he will do if he can; still, while bearing away, he may be forced to suffer a distant cannonade, ship with ship on equal terms, whether he veers and gets back upon his former tack, as at G in fig. 85. or continues to run before the wind, as at P in fig. 86. But if F persists to pass on a contrary tack to leeward, and without reach of cannon-shot, it is evident, whether he put right before the wind, or run off ship by ship as he best can, that B must at some time or other come up with his rear.

Effect produced by a Change of Wind during the action.

So far the attack has proceeded with the wind fixed in one and the same quarter. To make the propriety of it the more apparent, it will be necessary to inquire, what might be the effect produced by a change of wind, should that take place during the action? For this purpose, let the opponent fleets be placed in some one of the preceding positions, representing the attack upon the three sternmost ships of the enemy, as in fig. 87. in which the fleet desirous of making the attack is represented in four divisions, as at B, B, B, A, and F the fleet desirous of avoiding the attack, at the hazard of abandoning his three sternmost ships at G.

The Wind shifting by degrees and coming Aft.

In the commencement of the attack, let us suppose the wind to be N. and the ships going two points free on the larboard tack, or standing E.; and soon after the commencement, let the wind be supposed to veer round to the W.; then it is evident, by the disposition of the two fleets, that the fleet F, by such a change, will have acquired no advantage whatever; on the contrary, it will thereby be thrown just so much the farther to leeward.

The Wind shifting by degrees around Ahead.

Again, if the wind, by taking an opposite course, shall shift ahead and come round by the eastern quarter to L, the commander-in-chief of the fleet F will not have it in his power to avail himself of this circumstance, provided the commander of B, continuing carefully to watch his motions, and feeling the impulse of the veering wind, shall stretch his ships, as at OO, to the windward of the three ships at G, separated from F's fleet, and at the same time to the leeward of the main body of that fleet.—This will be apparent from figures 88. and 89. which exhibit the two fleets, after this manœuvre, both on the larboard and starboard tack.

The Wind continuing to Veer round the compass.

Let the wind be supposed to veer round gradually from the E. towards the S. and from thence to the W. and then quite round the compass. Then F being supposed to have gained the wind, it will be in his power to maintain it, and make a circular course to windward of B; but as he can be attended all the while by the fleet B, who will cut him off to leeward, he never will be able to recover his three ships, supposed to be cut off. This is evident without the illustration of a figure.

The Wind shifting to the Opposite point.

Lastly, if the wind in changing shall in one instant shift in direct opposition to where it was when the attack began, that is, from N. to S. ; then and in that case, before it can be judged whether such change shall be favourable for F or not, it will be necessary that the relative situation of the two fleets should be determined, such as it was when the change took place. For example, if the headmost ships of the fleet F, that is, if his van and centre shall have separated at any considerable distance from his rear, and shall, in consequence of this mode of attack, have advanced to a position as represented in fig. 90. it is evident that F, though by this change he shall have got to windward, will yet not be able to avail himself of this seeming advantage, the fleet B having it still in their power to cut him off from his three ships.

On the other hand, if this instantaneous change of wind, in direct opposition, shall have taken place more early in the action, that is when the positions of the two fleets shall be such as represented in fig. 87. (the fleet B in the position of four divisions B, B, B, and A, and the enemy in the positions F and G) ; then F, who before was to leeward, by this instantaneous change of wind from the north to the south, having now got to windward of every division of the fleet B, is it not evident that it may be practicable for him to carry assistance to his three ships at G in the rear, and perhaps even to cut off some of B's ships at A, if they do not with all convenient speed bear away to put themselves under the protection of their friends B to leeward ? But whether F shall attempt to effect this manœuvre, by veering his ships in the line, or, what seems most eligible, by making his ships tack, as it is to be presumed that his three ships, which have been some time engaged, must he considerably crippled, and not able to make sufficient sail ; while endeavouring to bring them off, it will be difficult for him to prevent being drawn into a general and close engagement, which, by the supposition, he has all along endeavoured to avoid.

CHAPTER III.

OF PARTIAL BREEZES OF WIND.

It often happens at sea, that when two ships are in sight of each other, one of them will be sailing at a considerable rate, being favoured with a breeze of wind ; while the other at the same time is lying becalmed, having no other motion than what she receives

from the tide or a current, if any, or from the swell of the sea. As this may be the case with respect to two adverse fleets when in sight of each other, that fleet which has the advantage of the wind will evidently use every possible method to prosecute the advantage that may result from it. Thus if the fleet desirous of making the attack be favoured with a breeze of wind, while the other fleet at the same time is lying becalmed, it is evident that the commander of this fleet will endeavour to get as near the opponent fleet as possible; whereas, if the fleet wishing to avoid an engagement be favoured with the wind, the other lying becalmed, then that fleet will avail themselves of this opportunity of making their escape.

The Fleet pursued being favoured with a partial breeze, after the attack upon his three sternmost ships is commenced, of little advantage.

If the attack upon the three sternmost ships shall have commenced before this partial breeze in favour of the fleet pursued has taken place; then the variety of positions in which the two fleets may be affected is so great, and the resulting consequences so numerous, that it would be an endless task to give a separate description of each. In the mean time, therefore, as it is imagined nothing in such investigation will be found that can materially affect the general issue; and since no breeze whatever can favour the fleet F, so as to enable it to sail round and round the fleet B, which all the while is supposed to be lying becalmed, it will not be too much to say, that *this partial breeze in favour of the fleet F, taking place after the attack began, although it may facilitate the escape of his van and centre, will not avail him much in the recovery of the three ships in his rear*—perhaps not in any case as yet exhibited, excepting this one, where the wind in one instant had changed in direct opposition.

The Wind shifting instantaneously in direct opposition.

Now let, as formerly, the attack be commenced before the partial breeze in favour of the fleet pursued has taken place, but that the wind has instantaneously shifted in direct opposition; then, even in this case, the same breeze which would favour F (fig. 87.) in the attempt to bring off his three ships, would at the same time favour the escape of the ships of B at A, as formerly described. That this partial breeze would require to be of considerable duration, otherwise F, in thus attempting to bring off his three ships, crippled as they will be, must hazard a general engagement, in like manner as already described.

Of some other methods of Attack.

Mr. Clerk employs a section of his book to show the propriety of his proposed attack from windward, in places where the hostile fleets are liable to encounter winds blowing in contrary directions at the same instant; but as this is a case which does not surely often happen, we shall refer our readers to the work itself, and conclude this article with some other methods of attack, which are suggested as improvements of that which is commonly followed.

1st. It has been proposed that the attack should be made with the greater part bearing down before the wind upon the six sternmost ships of the enemy. It is, however, evident, that ships by making the attack in this manner must be exposed, without a possibility of return, to as many broadsides from each of these six ships as can be got ready during a course of two miles. Hence, as the ships making the attack will assuredly be disabled before they can have it in their power to hurt the enemy, this mode of attack cannot be proper.

2d. It has also been imagined, that some part of the force chosen to make the attack should be sent to leeward as well as to windward of the three ships determined to be attacked. But the danger supposed, of shot passing over the enemy's ships, and striking those of friends, may be an objection to this mode.

3d. Others have been of opinion, that the headmost ship chosen to make the attack should come close up alongside of the sternmost of the enemy, and having delivered her fire, push along the line as far as possible, which may be supposed to be the sixth ship of the enemy; and as it is evident that this first ship may have received six broadsides, that is, a broadside from every one of the six ships of the enemy during her course in passing them, it has been thought possible that the other five ships, by following close after her, may attain their stations, each abreast of her opposite, without having received a greater number of broadsides than they have had it in their power to return; and therefore that by this mode the number of ships to be attacked will be determined: for as many ships as the leading ship will be able to reach, as many will the attacking fleet be able to carry.

4th. Again, let it be supposed, as in the former case, that the fleet making the attack has been brought up to action in a collected manner, but subdivided only so far as the service may require, and that the leeward division shall be more particularly destined for the immediate attack, while, at the same time, the body of the fleet keeping to windward shall be supposed attentive to give the necessary support where required; then let it be supposed, that the headmost ship making the attack having been soon crippled, shall not have been able to push farther than the third or fourth ship of the enemy's line—is it not easy to conceive, it is asked,

that some one or more of the ships to windward, attentive to support and supply her place, may bear down on the fourth ship of the enemy, under cover of the smoke, throw in her fire, and push on to the fifth or sixth ship, or perhaps farther; and that so far as this fresh ship, or a second fresh ship, may be able to push, so many ships of the enemy may be expected to be carried? For whatever ships of the enemy can be got abreast of, at a proper distance, *may be disabled, and therefore commanded*, by the numerous fresh ships kept to windward for this purpose.

In all these various methods of attack, the fleet making the attack is supposed to sail faster than the other, or at least to come up with it; and that so soon as the ships are engaged, their velocity will consequently be diminished. That being premised, a more proper mode of attack than any of the preceding will perhaps be as follows:

5th. The first or headmost of the ships intended to make the attack is to range alongside of the enemy, and preserve that station. The second ship is to make all possible sail to luff up and pass the first ship, which is now supposed to be engaged, and get alongside of the last but one of the enemy, which she is to engage. In like manner, the third of the attacking ships is to get alongside of the last but two of the enemy, whom she is to engage; and if it be deemed expedient, the fourth, &c. ship may be engaged. It is, however, evident that this method can only be practised when the wind is brisk, and that a calm, in consequence of a vigorous cannonade, may render the attack upon more than three or four of the enemy's ships impossible.

In all the different attacks upon the rear, it has by some been thought a great object, if practicable, to throw a raking fire into the rear of an enemy's line of battle, by ships detached for that purpose. For if shot, as has been said, can take effect at a distance of two miles, from this position it will surely reach the sixth ship, if the enemy's line shall be formed at two cables' length asunder; and if formed at one cable's length asunder, it may reach and may cripple the twelfth ship.

We have now given a cursory view of Naval Tactics in its present improved state; and shall take leave of the subject, with earnestly recommending to our nautical readers Mr. Clerk's Essay, which, if allowance be made for the author's peculiarity of style, will surely meet the approbation of every officer who wishes to see the practice of naval war founded on principles of science.

PART III.

ON SINGLE ACTIONS.

It is impossible to delineate any regular system or line of conduct for commanders to pursue in action, since so much will always depend on particular circumstances, such as wind and weather, positions and evolutions of the enemy, &c. from which it is obvious that a manœuvre which would be attended with success and advantage in one instance, might be the reverse in another; therefore, judgment and skill alone must direct them; yet a few observations may not be unattended with the desired effect of assisting the practical knowledge of the American officers, and of the juvenile part in particular.

When a commander is informed that a strange sail is in sight, he should give immediate orders to the first lieutenant (except when on particular service) to make all possible sail in chase.

He should select the necessary signals to be made and have them written on paper, ready, when they are required, to give to the signal officer, and should have the signal books packed in an iron case, to be thrown overboard should the event of the engagement terminate in his defeat.

When sufficiently near the stranger to discover that she is a vessel of war, he should order the first lieutenant to prepare for action and beat to quarters, and the signal officer to make the private signals, which will be answered by her if she is a United States vessel; yet though she should answer the signals and display the American flag, we would still advise him to keep his men at their quarters until the fact is determined either by one of his officers going, or one of them coming on board, for deceptions are often practised by an enemy when they have gained possession of the private and other signals; nor would her being a United States vessel, and well known to every officer on board, be any excuse for dismissing the men from their quarters too soon, or exculpate him from the just censure of a court martial, should he suffer a surprise from an American vessel in the possession of an enemy, or one of their own vessels in disguise, when such things may so often occur.

[We shall here mention, as an example, a curious circumstance of this kind which happened in the year 1805, in the English grand fleet under the command of Lord Cornwallis, then cruising in the chops of the British Channel, watching the motions of the French fleet in the harbour of Brest. A French line of battle ship, com-

manded, we believe, by an Irishman, was separated from the Rochfort squadron in a gale of wind on the coast of France, and bore up for Brest, in which attempt he had the misfortune, when standing in for Ushant, on a very dark night, to find himself in the centre of the British fleet. What was to be done? To make sail might draw the attention of the fleet, and even should he get clear of them, the look-out frigates would discover him at daylight and either bring him to action or alarm the in-shore squadron. Thus situated, he knew that stratagem alone could save the ship, and with the greatest presence of mind he shortened sail and joined the lee line of the lee division, then commanded by Sir Chas. Cotton, and strange to relate, he remained two days with the fleet, mistaken for the Montague 74, who had separated the night before from a squadron, which had that day joined the fleet from Torbay. He now admirably followed their evolutions, answered the signals with the rest, and guessed their signification from the manœuvres of the surrounding ships. On the third day the fleet stretched into Ushant, with a fine leading breeze, to relieve the in-shore squadron; and when the general signal was made for all the captains to repair on board the admiral's ship, Pat quietly dropt out of the line, in shore, and prepared for a start, whilst the admirals and captains were on duty on board the Ville de Paris, then the flag-ship; and though many of the officers thought the captain of the Montague was very careless, yet no suspicion was awakened until he was nearly out of gun-shot, when he up studding-sails and French colours, and to the astonishment and mortification of the British ran safe into Brest.]

Should the chase prove an American man-of-war, he will discover on her showing her number if her commander is his superior or not, as it is the etiquette of the service for the inferior commanders, on falling in with a superior at sea, personally to pay their respects to him, and produce the orders they are acting under, except when they have despatches on board, which should be made known to such superior officer, either by telegraph or signal.

Should the chase neither answer the signals nor show her colours, a commander is justified in supposing her to be an enemy; and should, if not of too superior a force, prepare to bring her to action; yet, as she might be a neutral vessel of war, he should, when sufficiently near to shorten sail, first hoist his colours and fire a shot across her, to make her heave to and show hers.

This complied with, will determine to what nation she belongs; but should she, after this summons, still persist in not showing her colours, a commander of a national vessel of war is justifiable in treating such ship, though a neutral, as an enemy until he is perfectly convinced of the contrary.

When a commander has discovered the chase to be an enemy, nothing remains for him to do but to bring her to action and exert his utmost skill and endeavours to capture her.

Evolutions so much admired by most naval officers are, in our opinion, unless to gain a raking position, unnecessary in single actions ; though certainly, in general engagements, of essential service and indispensable utility; for why should these manœuvres, uncertain in their effect and dilatory in their execution, be pursued, when a more determined and decisive mode of fighting may be followed, and which will so speedily decide the contest, unless the commanders wish to impress each other with the admiration of their skill instead of their courage ? We would recommend to a commander, from much experience and many reasons which we shall bring forward in support of this manœuvre, always, if the wind and sea will permit, instantly to board the enemy, by running close up alongside, discharging a well-directed broadside, and throwing the men on board, if possible, on his weather bow. This would evidently take him by surprise, as his men would be at their quarters, in expectation of a cannonade ; however, we shall dwell more particularly on this point under the head of *Boarding*, and confine ourselves here to the remark, that boarding has universally succeeded when attempted on the commencement of an action, and as universally failed when embraced by desperation as a last resource ; for an example of which, in the first instance, we have only to refer to the actions between the Chesapeake and Shannon, Milan and Cleopatra, Wasp and Frolic, with Paul Jones and the Serapis ; and for the second instance, I may bring forward the affair of the La Pique and the Blanche, with a number of others too tedious to insert.

The cause why success generally attends the manœuvre of boarding on the first onset, and the want of it when delayed, is obvious : for this manœuvre, on the commencement of an action, is always attended with some degree of surprise, both from its being unexpected and so seldom practised, and the assailants are full of ardour, courage, and strength, whilst their sudden and determined attack must strike a panic (for the bravest men* are liable to it on sudden events) and confusion amongst the enemy, which will spread, for it is infectious, and soon ripens into flight or disorder, either of which must make their ship an easy conquest. But allowing the enemy to be prepared for such an event, is it not better to decide the contest boldly at once, than to waste a greater effusion of blood, and endanger your vessel from a heavy cannonade, and which may compel you at last to board under every disadvantage, for the enemy aware that it is your last resource, and that your numbers must be few, will receive your poor dispirited men, jaded from the fatigues of the action, with twice their vigour and courage, convinced that a brave defence must terminate in your defeat ?

Privateers, as they cruise alone for plunder, should be as economical of their spars and men as possible, which boarding alone

* Witness the British General Sir John Moore at the battle of Corunna.

can ensure, as it prevents that destruction which is sure to ensue from a heavy cannonade, and as they chiefly attack letters of marque and merchantmen that are easily overpowered by the superior numbers of a privateer.

Should it be found impossible to board from its blowing strong, with a high sea, which must endanger the vessel, a commander must endeavour to lay his ship on the enemy's weather quarter, and order a platoon of the four aftermost guns to keep up a constant fire at the rudder and stern—one gun forward, one in midships, and one aft, with good marksmen, to fire solely at her masts, and the remainder to keep up a brisk and constant discharge of round and grape, and level alone for her ports, for in this position it will be an oblique or raking fire, which will render her unmanageable, unman and dismount her guns, and appal the stoutest heart, with the slaughter which a well-directed fire must cause from such a manœuvre ; nor can she extricate herself from such a position, which gives you so much advantage, without changing it for a worse ; for

Should she attempt to wear, give her a broadside when her stern is exposed in the evolution ; then fill and heave in stays, which will enable you to bear down again, on the same point or across her bows, as circumstances may require ; or,

Should she fill and attempt to shoot ahead to get across your bows, put your helm up, run close under her stern, give her your whole broadside, then put your helm hard-a-lee, shoot up upon her weather quarter again, and give her the other broadside ; and if not altogether impracticable, would instantly board her in the smoke, but, as we have said, these manœuvres will alone depend on the skill and judgment of the commanders.

ON FIGHTING BOTH SIDES.

The men of every other gun, beginning from forward or aft, are to be stationed to the guns opposite ; and as this leaves every other gun on both sides vacant, the men of the next gun, beginning from forward or aft, will work both, leaving always the sponger and powderman to load one, whilst they run out and discharge the other, and so on alternately.

TO BOARD TO WINDWARD, OR TO AVOID BEING BOARDED.

If it be desired to board a ship which keeps her wind under an easy sail ; or that does not shorten sail, but over which the board-

ing vessel has the advantage of sailing; she must get on the weather-quarter of the ship she means to board, within half pistol-shot. She should then begin the action, and continue it with vivacity, to cover her manœuvre by the smoke of the cannon and musketry of both ships; then, under the cover of this cloud, let her make more sail if she has not way enough, in order to augment the velocity of the ship and the rapidity of her movements, that she may more readily lay on board her enemy, on the weather-side, either exactly a-breast or a little abaft. This is very easily executed, by edging down suddenly upon her; so, however, as not to be raked by the enemy's fire. The ship boarded by this manœuvre can hardly suspect the design but at the moment when, or very little before, the grapnels will be on board of her. In this situation the boarded vessel has but one doubtful experiment to try, and which even will be of no service if the boarder observes her well. For, the moment she braces sharp a-back her headsails, to cause the ship's falling off, (§ 37) and squares those aft (§. 36) to give her sternway, the boarder has only to perform briskly the same manœuvre, and they will then be both as near for boarding as before, provided the boarding ship feels quickly the impulse of her sails and helm, which ought to be put a-weather (§. 50) and kept so till the ship's headway ceases, when it is to be put a-lee (§. 58) to assist her in falling off, in manœuvring as in box-hauling, in order to board the enemy to leeward; for, the boarder ought to be on the quarter of the other; since, at the moment the two ships were right before the wind, she who was directly to windward, and wished to board, had only to continue her movement of rotation, and render her velocity equal to that of her adversary, by shortening sail in order not to pass her. If, therefore, the circular motion is kept up by the boarder, which at first caused him to fall off, and now brings him to the wind on the other tack, he will join the enemy to leeward; for it is evident that if this motion of turning be more rapid that that of the ship which wishes to avoid boarding, the boarder will close her before she can range to the wind on the other tack, since the boarder comes round with greater celerity. However, if the ship which fears boarding was pressed thus closely, she could make no other attempt than to throw once more all her sails to the mast, by bracing them only perpendicular to the keel to give her sternway, (§. 36) and putting the helm a-weather, to keep her to the wind, as soon as her headway ceases; (§. 58) observing that, she being to windward, this manœuvre may cause her to drive on the boarder, as he is then watching for her under her lee. As there is no other resource, necessity obliges her to this expedient; because, if the ship which is attacked could go a-stern with sufficient velocity, she might let the boarder pass ahead, veer under his stern, and rake him, if he is not as quick as the other to foresee this manœuvre, and as nimble in manœuvring in the same manner as the enemy's ship: because, the great velocity with which he comes to the wind and

goes a-head, (his sails being still full) puts him in this bad situation, which may prevent his persisting in the inclination of boarding. It is however very clear that the boarder will attain his purpose, if he takes care to throw all his sails a-back at the same time as the ship to windward; because, the attacked ship dropping to leeward, and having sternway first, approaches a little the boarder, who has still preserved his position on the quarter, and longer kept his luff, by having gone a-stern somewhat later than the weather-ship. It must be farther observed, that when the two ships are right before the wind, if the vessel which fears boarding moves quicker to the wind than the one which attacks, she will avoid it, as the retreating ship will be close to the wind before the other, and able to get a-head of her by making all sail to keep her wind, or to heave in stays and get upon the other tack. But it must be considered that this last movement is disadvantageous; as, by so doing, it will present the stern to a ship, which no doubt will take advantage of that situation, and rake her; which might be more destructive than a well-opposed attack by boarding.

There is, however, no doubt that if the ship inclined to board sails better than the other, it will always be in her power to execute that design, if she is manœuvred as the ship which flies.

We would recommend laying an enemy on board on the weather-bow, for several reasons, viz. 1st, You can extricate the ship from that position better than any other. 2nd, If you hold fast or get lashed, you are in a position for raking instead of being raked, as you would be if you were on either quarter, which was the case with the La Pique when she attempted to board the Blanche. 3d, In this position you can board with more regularity and with greater numbers entering at once from several points, as for instance from the fore-chains, bowsprit and head, whilst only the numbers which will fill up the gangways can oppose you until you drive them back into a more open space; your marines taking care to scour the booms, tops, and boats, &c.; and lastly, if you are compelled to make a precipitate retreat, you can cover it better, and then, if you please, either extricate yourself, or commence a raking fire.

On preparing to board, the marines will be drawn up to cover the boarders. The boarders will be drawn up in two distinct close columns, with pikes and cutlasses, &c. under the command of the 2d and 3d lieutenants.

Two platoons of 20 men each, under the command of mates or midshipmen, will be drawn up with musketry to act as lines of reserve, or support to the columns. Two detachments of ten men each, which should be selected for good marksmen, with small arms under the command of midshipmen, will be drawn up to act as light companies or scouts, that is, to hover about and pick off the stragglers, men in the tops, &c.

When the word is given *to board*, the 1st lieutenant is to command in person, the marines will open a brisk fire on the enemy's deck to afford a landing. The column commanded by the 2d lieu-

tenant will board first and get possession of the opposite side of the deck.

The column under the command of the 3d lieutenant will follow and take possession of the side on which they board.

Both columns will then charge the enemy along each gangway, and when they gain the quarter-deck, each column will extend its line by bringing up the rear ranks in front; however, they are not to be less than three deep.

The lines of reserve follow next; they are to support and flank the columns, the detachments then go over, they are to hover about, pick the men off in the tops, waist, and wherever they can see them, aiming chiefly at the officers; in short, they are the same as light or rifle companies in a field of battle. The marines will remain in the rear at some distance, and keep possession of the ground already gained, and those in the waist in check.

The 1st lieutenant's judgment and circumstances must now certainly direct him, and should he get repulsed, he should endeavour to rally his men, which, if found impossible, he should conduct a good retreat, under the cover of the lines of reserve and marines.

When the enemy has struck, her commanding or surviving officer should be brought on board to surrender his sword, the ship's papers secured, the prize manned, and the prisoners removed and well guarded, the guns of both ships, and magazines should be next secured, the dead thrown overboard, and the decks washed down, and every thing safely returned to its respective department; after which, a general muster should take place, and a list of the killed, wounded, and missing taken, after which both ships will repair damages, and either separate or remain in company, as the commander may judge expedient.

TO BOARD TO LEEWARD, WHEN CLOSE TO THE WIND, OR TO AVOID BEING BOARDED.

In order to execute this manœuvre, the boarder is to come within pistol-shot, close in the wake, or, at most, to the weather-quarter, of the ship he means to attack; taking care to continue steering so as not to be raked by any of the guns which belong to the quarter he stands on. Then, to come up with his adversary, he must edge away a little, and range round aft, so close upon the enemy's lee-quarter, that his cat-head may almost touch her quarter-gallery. Now, when you have shot sufficiently a-head, your ship being parallel to your adversary's, so as to bring your forecastle a-breast of your enemy's mainmast, the mizen and mizen stay-stay-sail sheets are to be hauled well aft, the helm put hard a-lee, and the head sheets let fly; then, your ship coming rapidly to the wind, (§. 40, 50, and 51) shivers her sails, and closes the opposing

vessel side to side. This manœuvre is infallible when you have the advantage of sailing, provided very great attention is paid to it. But great attention is necessary; because, if at this moment the weather-ship, which wishes to avoid the boarding, either sets her courses, or lays all those flat a-back which she had set, she may perchance break the grapnels if you have neglected to trim your sails in the same manner as hers: for, by making more sail, if the wind be a little fresh, she will shoot a-head through the water, and drag the boarder with such force as to break the chains or hawsers by which the two ships are confined together. By laying all flat to the mast, the boarded vessel is still more likely to succeed, since the sails of one ship will be full, while those of the other are aback.

This mode of boarding may, as shown before, be anticipated and avoided, if the boarder does not pay the strictest attention to his own as well as to his adversary's manœuvres: but it may be still more readily avoided, if the last-mentioned vessel braces her head-sails sharp a-back, setting only, if necessary, the fore-sail (§. 37) at the same instant laying to the mast or shivering (according to the necessity for more or less sternway) all those which are abaft, (§. 36) and putting the helm hard a-lee. (§. 58.) All this is to be executed when the boarder is still about a ship's length (more or less) a-stern of the other vessel. The quickness of this evolution, and the rapid veering of the weather ship, may bring the boarding-vessel, which is a little to leeward or a stern of the other, into the most dangerous situation, if she does not manœuvre in the same manner and with equal celerity; as the boarder's sails, being full, keep up his velocity, and may, before he can veer, engage his bowsprit in the main-shrouds of the enemy, who pays short round on her head.

This terrible and dangerous situation is infinitely to be dreaded; and it is of the highest importance to pay the strictest attention to your own manœuvres, and to those of your opponent, which you are to endeavour to foresee and avoid as much as possible.

It is easy to conceive, that, if you wish to board a ship, and to engage your enemy's bowsprit in your main-shrouds, you need only get a little to windward of her, and about one or two ships' lengths a-head, more or less, as (from the knowledge you have of the celerity of your ship's movements) may be judged sufficient; then brace sharp a-back the head-sails, shiver the after ones, or lay them flat to the mast, with the helm a-lee. This manœuvre, well executed, and covered by a brisk fire, will commonly succeed; but care must be taken not to come round too soon, but to range very close to your adversary; because, if you should not be a-head enough of him, you might fail in boarding, by paying too short round, and then you would infallibly get your bowsprit foul of his fore-shrouds, which would be highly disadvantageous.

If you should find yourself too far a-head, the design will be frustrated, by your passing under the bowsprit of the enemy, who

will, however, be thereby exposed to be raked at his head, if he does not manœuvre in the same manner, and with equal swiftness as the boarding-vessel, which has the great advantage of priority.

It is absolutely necessary to range very close to the ship, whose bowsprit you wish to engage in your rigging; because, if you attempted to execute this at only a ship's length large and to windward of your opponent, he has only, the instant he perceives your design, to put the helm hard a-lee and heave in stays, if he does not choose to act in the same manner as you do. If this last method is properly executed, the two ships can only range very near each other and exchange their broadsides, and the lee-ship will immediately gain the wind of her adversary. Therefore, to execute this manœuvre well, the vessels must be nearly yard-arm and yard-arm.

If the boarder be at a certain distance aft on the weather-quarter, the ship, wishing to avoid boarding, must heave-in stays as soon as the other vessel is in the act of veering, in order to close her to leeward. By this manœuvre they will find themselves head to head, so that they may fire reciprocally their broadsides, in passing on opposite directions, and the lee-ship will get to windward.

TO BOARD WITH THE WIND LARGE.

If two ships engage with the wind large, the boarding vessel should keep as close as possible on the lee quarter of the ship she means to attack thus, that she may execute this design, as has been shown before, by coming rapidly to the wind, and being careful not to pass ahead of her opponent.

The weather ship, to avoid being boarded, must act on her part as was directed in the preceding article, according to circumstances.

A ship may also be boarded on the weather side, by conforming to what has been said of boarding to windward.

When two vessels are engaged, with the wind right aft, the ship desirous of boarding ought to drop astern of the enemy, in order to run up close alongside of him, if the boarder has the advantage of sailing; for, as she then advances towards her adversary, her adversary can only endeavour to range rapidly to the wind on the other tack, as soon as the bowsprit of the boarder is abreast of her stern, and thus gain the wind, in order to be in a situation to extricate herself more easily by a good manœuvre.

The boarding vessel should be permitted to come abreast of the stern of her adversary before she hauls her wind; because, if she were to do this sooner, the ship astern, at a small distance, would board her perfectly well, even if they sail equally swift, since the boarder would be to windward, would run large longer than the other, would range more slowly to the wind, and continue

to stem ahead of the flying ship. What makes this more evident is, that the boarder, coming from windward, preserves longer his velocity, trimming his sails only as the ship comes to the wind, and cuts the course of his adversary with a line less curved than that described by the retreating ship.

If, by coming too soon or too fast to the wind, the boarder chose to abandon his design, he might do so by veering a few points on the other tack and shortening sail; so that the retreating ship will show her stern, and the boarder can then rake her by passing under her stern.

When you attack a ship closely to leeward, you may keep away a little, when you are abreast of her, seeming to yield under her fire. If this should induce the opposing ship to veer, in order to keep you more under her guns, you have only to heave rapidly to the wind, by putting the helm a-lee, trimming all sharp abaft, and suppressing the effect of the head sails; all of which is to be done in the same instant you perceive the enemy bears down upon you. The quickness of this manœuvre, and the priority of the movement you gain thus on your enemy, will soon close the two ships; and, if proper attention be paid, and the distance well measured, it may happen that the enemy's bowsprit will be entangled in your fore or main rigging; which would be a most advantageous thing in your attempt to board. But much confidence must not be placed in this, as you do not frequently meet with persons so easily duped: it may even happen that you will no longer be able to attempt the boarding, if the weather ship, instead of bearing away, plied to windward more and more; for this feint manœuvre may take you too far off to leeward of your adversary. If you should happen to be a ship's length to leeward, and about the same distance ahead of the vessel with which you are engaged, you may, under cover of a heavy fire, heave in stays. By this manœuvre you come right athwart the enemy's hawse, rake him fore and aft, and board him, his bowsprit being right over your gangway; nor can he possibly avoid your broadside; for, if he heave all aback and make a stern board, which is his only resource, he may avoid being boarded, but will always be in a very bad situation.

BOARDING AT AN ANCHOR.

If it be intended to board a ship which is at an anchor, riding head to wind, it must be executed under sail; for, if you cannot approach the enemy but by towing yourself ahead, you will never be able to board her against her will; since it will always be in her power to annoy the boats which are laying out the tow-lines. It ought not, therefore, to be attempted, unless you are under way. To perform this with success, you must be sufficiently to wind-

ward to approach her by a little failing off, without exposing your stern to her fire, which she could play on you with great advantage in this situation. Supposing, therefore, the boarder to be thus to windward, so as to be able to approach his opponent at anchor, the assailant ought to stop his headway, by taking aback his mizen-topsail and fore-staysail, and when about a ship's length ahead of the vessel he means to board, let go an anchor; then work in such a manner, that as soon as the mizen-topsail is taken aback, the mizen close aft, the topsails clued up, and the fore-topmast-staysail hauled down, he may come head to wind, and veer away cable, till, by falling off, he comes board-and-board with his opponent, who is still riding at her moorings, and who, at that instant, ought also to be raked by the boarder.

The boarding ship has no other way of manœuvring but this; because, as soon as the anchor is gone, the ship acquires sternway; and when the cable is checked, she comes head to wind, in which she is greatly assisted by the mizen and mizen-topsail, which impel her stern to leeward (§ 40 and 44.) till the wind is right in the direction of the keel; and as the cable is veered away till exactly alongside the ship at anchor, her own anchor being right ahead of the vessel she means to board, it follows, that as soon as the boarding ship comes head to wind, she is in a proper situation to throw her grapnels, and send her crew on board of the other, if they are the strongest.

The ship at anchor should never wait for the enemy in that situation, which is always disadvantageous, and there is always much greater probability of getting clear when under way. But if, for some unforeseen cause, you are obliged to continue at anchor, you are to take advantage of the moment when the ship which attacks lets go her anchor, to cut the cable by which you ride. By this manœuvre you fall athwart, rake your adversary, avoid being boarded, and bring up with your lee anchor. Besides, if time will admit before the attack, you should not neglect to cast two springs out, one on each side of the cable by which the vessel rides, if you have not had time before to lay out two anchors, in order not to be surprised, in case the ship which attacks has it in her power to pass on either side of you: and when you perceive for which side she is determined, you heave on the spring which is on the same side she has let go her anchor if she be ahead, and on the opposite if she be astern, veering out at the same time the other spring and cable, till you bring the assailant right abreast of you. Then you may rake him at pleasure, as he has no way of getting out of this dangerous situation. His only course would be to prevent this danger by having a spring also; and, under cover of a brisk fire, veer upon that spring and cable to lay his enemy handsomely on board. But if he has neglected this precaution, he must cut his cable, and drop on board of the ship to leeward; who, on the other hand, has no way to

avoid being boarded, but by cutting to get under way or to run on shore.

It is always easy to board a ship at anchor when the wind will allow you to approach her under sail; and the best way to proceed is, to run her alongside, or to bring-to to windward of the ship you wish to attack, keeping her exactly to leeward of you; then drift on board of her, by trimming your sails in such a manner as to keep as near as possible your broadside opposite to that of the adverse ship; annoying her with your guns till you can close her, and your constant cannonading may prevent her fire being so well served as might otherwise be.

When you are under way, and purpose to board a vessel moored, let go an anchor at the time of boarding; for, if the ship attacked should at this moment cut her cables to drive on shore, this would prevent your running aground together.

BOARDERS.

Boarders are the first division, under the command of the first lieutenant, and are called on being boarded, to repel the attack. This method not only prevents confusion, but gives every advantage; for whilst they are opposing the assailants, the remainder, at the guns, can keep up a brisk fire on the enemy, without having it returned, as he would be afraid of killing his own men; though, should the boarders be found insufficient to defend the ship, the remaining divisions should be led in order to the charge. We would also advise boarding with the three divisions with pikes, cutlasses, and tomahawks, under their respective officers, and led by their commanding officer, with the marines to cover them, and hold the ground they gain, as it will speedily decide the contest, and spare a great effusion of blood.

These divisions should be frequently exercised in their relative duties, for practice makes perfect, and perfection is mostly attended with success, and sham-fights both amuse and instruct crews. [Capt. Rousseau, late of the French imperial frigate La Junon, who bravely fell in an engagement with the British frigates Horatio and Latona, in the West Indies, used to allow his men to decide their own private quarrels, in a fair combat, with single sticks; and though this was not according to the strict rules of discipline, it had the desired effect of preventing petty complaints, and rendering the men familiar with the sword.]

SAIL-TRIMMERS.

Are the second division, under the command of the second lieutenant, and are to trim sails in action; they should also be

subdivided into three divisions, as part of their duty may not require the whole, and the commanding officer can without confusion order any part to the service required; for instance, "send the first division of sail-trimmers aft to the weather mainbrace—first division sail-trimmers forward, second and third aft, wear ship," &c. &c. When the duty is done they return to their quarters.

REMARKS ON THE GENERAL UTILITY OF ONE UNIFORM SYSTEM OF GOVERNMENT ON BOARD OF ALL SHIPS OF WAR.

The utility of a general system of acting is found indispensable, and seems to have been adopted in every profession but that of the navy.

Ships are constructed on the same models, navigated by the same principles, but not governed by the same regulations. The consequences hence arising are so apparent, that we shall endeavour to point out the advantages which would result from the adoption of an uniform principle, and mark the prejudicial tendency which the want of it has at present on the service. The articles of war, which specify crimes and punishments, are, indeed, general, but it is not on them alone that the internal regulation of a ship depends. Good discipline is acquired by approved laws and regulations, duly observed and enforced, which will assist what must always, in a great measure, depend on the abilities and disposition of the commander. Regulations may sometimes be adopted by a captain, which have been composed by some other person; and, it will be happy for the service when, conscious of his own inability, he accepts that assistance from another, which his own experience cannot afford him. It is surely better to have good regulations, without adequate abilities, than to possess neither; but an entire dependence on the qualifications of a single person to conduct so great a charge, where so many casualties may intervene to prevent his doing justice to it, strengthens the idea of the necessity of establishing general rules for the internal government of the navy: for besides the beauty of appearance in having an uniform method of carrying into execution the duty of a ship, it would have the good effect of preventing discontent amongst seamen, by the frequent alterations made by different captains, who, when they succeed to the command, very often change every existing regulation. The officer, also, who has been many years on half pay, cannot be supposed to have every form so ready, as the one who has been constantly in employ. The spring of action may be relaxed without being broken, but time will be required to

reanimate it. A well-chosen and public system of carrying on his duty may therefore assist him, when his services are called forth after a long interval of inaction. The American navy has shown with great splendor in its several combats, but that must be attributed to the spirit of Americans. Discipline may overawe a coward, but cannot make him brave; the dread of ignominy and punishment may act as a spur on a poltron, and command his attention, but to Americans it is rarely wanted.

This has been evinced by the voluntary acts of bravery displayed in different actions, on board private armed vessels. We call them voluntary, because where discipline relaxes, commands become less attended to, and the inclination of the seaman is alone depended upon in obeying them. The officer who comes forward from half pay, after a long interval of relaxation on shore, finds himself deficient in the common points, which are habitual to those in employ ; he executes his charge of fitting the ship for sea, with that diffidence which belongs to inexperience ; and, instead of establishing his method in a progressive state, and instructing the inferior officers and seamen with that particular mode of carrying on the duty which he means to pursue, every thing is neglected. In this case, the seaman, from not being confined to one system, acquires a careless indifferent habit, which becomes the more apparent when the ship arrives in company with a well-disciplined man of war. Its commander then sees her inferiority, and recovers from his apathy ;—new rules and regulations are now made, or perhaps first instituted, and the whole economy of the ship becomes a wild chaos of confusion. Innovations are multiplied without number, and what would at first have given general satisfaction, is now the subject of ridicule and disgust ; which, to an ill-disposed ship's company, is the forerunner of desertion and discontent. We shall therefore commence our remarks at the first commissioning of a ship, and go regularly through those leading points that are attached to every man of war, and to which every officer appointed to the rank of a lieutenant, is supposed to be competent. The first object of every captain in the navy, on his appointment to a ship, must be to have those officers with him whose dispositions he is acquainted with, and upon whose abilities and attention his character, comfort, and happiness, are, in a great measure, dependent. Indeed, it is almost necessary, in order to have good discipline in a ship, that the captain and officers should serve together by choice ; the good understanding subsisting between them would then beget that confidence, so essentially requisite between a superior and his inferiors. When persons so widely separated by rank and command as the captain and his junior officers, accidentally meet together, the former is naturally tenacious of his authority, and cautious of every power that he delegates to another ; to one especially, with whose abilities and disposition he is unacquainted. On the other hand, perhaps, from being too scrupulous, the officers become diffident of exerting themselves ; and from

not impartially weighing the motives of their commander, may sometimes neglect those points which would be of the greatest service. This consideration, although affecting all officers, more particularly affects the first lieutenant, as the executive officer, upon whose abilities the whole movement of a ship depends.

A captain, therefore, satisfied with the person in this situation, has a degree of policy in leaving the whole internal management to his direction, marking out the chief lines by which he means the duty and government of his ship shall be performed; at the same time leaving him a certain latitude to improve and digest them into method and regularity. Hence appears the propriety of the first lieutenant's being appointed on the recommendation of the captain; for as he lives with the other officers, he will make the captain's method and disposition known to them and reconcile things which, at first sight, might be disagreeable.

Every captain of a ship of war should recollect, when he has obtained his chosen first lieutenant, that the exertions of this officer will be in proportion to the confidence reposed in him; and that interference in his department, and unnecessary orders, are the most certain means of damping his zeal and ardour.

A sensible good officer, when trust is confided in his abilities, will never take advantage of it, but deem such confidence an additional spur to his exertions. To have good discipline and order in a ship, must be by the unanimity of the whole, which cannot be obtained without little concessions on all sides. The captain may give violent and disagreeable orders, by which he gets that duty performed through fear, which, if temporized, might be done by good will. It too often happens, that the disposition of superior officers is biassed by passion and prejudice, which, when once suffered, is with difficulty subdued again. To be angry with, or to express a contempt for an officer, because he is awkward in his person, does not dress immediately to the taste of his commander, or has a way of carrying on duty different to his own, is ridiculous; these are points easily to be gotten over, and at worst but trifles in themselves, particularly when compared with those of inability, drunkenness, and neglect of duty. A ship has few comforts in herself; those she possesses ought, therefore, to be cultivated with the greatest assiduity. How shocking is the idea, that an individual, placed over a large community, should rack and torture his imagination to invent new modes of harassing and perplexing those under his command! Let every necessary point of duty be carried on with that spirit and authority, which will stamp and give credit to order and discipline, and which will never suffer the smallest relaxation to interrupt the service required to be performed. Let the conduct of a commander be uniformly strict and circumspect, that he may hold out an example in himself, and by his impartiality in doing justice to merit, hold forth at the same time, an encouragement to men to use superior exertions in their duty, and to comport themselves with becoming propriety. Let his orders be

given with that grace and good nature which cannot fail to please the person who receives them; and when he can grant an indulgence, let it be granted cheerfully and graciously.

What a contrast may be observed between the captain, respected and beloved by his officers and ship's company, who are never so happy as when he is amongst them, and the captain whom every one reviles for his cruelty and oppression, in whose ship no ease or comfort exists but in his absence! There is an error, which seems to have been sometimes acted upon by commanders of ships of war, arising from the idea that a captain would do himself service by obtaining the good-will of his ship's company at the expense of that of the officers—How mistaken is such an idea! To seek for popularity by making those appear ridiculous to whom he looks up in the hour of danger, is highly derogatory to the character of an officer.

The high opinion of a ship's company is very transitory, and seldom possessed for any period of time without some variation; prejudice, most frequently, will bias its opinion; and besides, no fame is either so permanent or so easily obtained, as that which is acquired by doing justice to all. Let the name and character of an officer be held sacred; and if, contrary to the sense of dignity and honour which he ought to feel himself the guardian of, he should be found to have forfeited the respect due to his situation, the rigour of the law, if only as an act of justice to other officers, should be enforced. It is very seldom that seamen entertain contempt for their officers, unless when those officers have sacrificed their own characters. When gentlemen strip themselves of that consequence which makes their inferiors look up to them with respect, are they to expect that every improper act which they commit will be attributed to accident, or can they suppose that their subordinates will seek for excuses to palliate their misconduct? No. It is for these reasons that persons placed in a superior situation should be guarded in all their actions; for, it is obvious, that in proportion as the seamen get enlightened, the officer should exalt in his conduct and example, because vices and misconduct that would not be noticed by absolutely ignorant people, will be severely scrutinized and investigated by those of more knowledge and discernment. We may also observe, that a captain cannot be too particular in checking every growing folly amongst the officers. Young men frequently expose themselves to ridicule from imitating the manners of others, without considering the motive, or judging of the propriety of the example they vainly attempt to follow.

I have always observed, that precept and example are as much studied and attended to on board ship as in any part of society, and where the captain is particular in his own conduct, and vigilant over that of his officers, the people are more orderly, and punishment is the less necessary. The necessity of giving written orders, as we have observed, is subject to a variety of opinions; but when

an officer reflects that this mode of conveying the directions of his superior, is not only a memento of his commands, whereby all whim and prevarication are baffled, but also an authority and justification for whatever he does, I think no one can dispute the solid advantages to each party of the one, over the ideal delicacy of the other. As the most certain method of having orders generally understood and duly obeyed, we would recommend written orders to be always preferred whenever it is possible to issue them, and have for that purpose selected the most approved Rules and Regulations, which are subjoined under the head of General Orders.

FORM OF GENERAL ORDERS FOR THE BETTER GOVERNMENT AND DISCIPLINE OF ARMED SHIPS.

(*Supposed to be issued by the Captain.*)

Having thought proper to establish the following rules for the guidance of the officers and ship's company under my command, it is strictly required that no deviation whatever takes place without my knowledge and concurrence ; but that every person obey them in the fullest sense, together with any additional instructions that I may think proper to insert in the orderly book, for the good of the United States navy.

1st. Each lieutenant is to take a copy of the general orders, and of those issued separately to the officers in their respective departments, after which he is to sign his name in the orderly book, which signature is to be considered as an acknowledgment of his having so done.

2d. The health of the ship's company being the first consideration, every possible attention is to be paid to promote it ; for which purpose a free circulation of air must always be kept up, the hammocks got up in the summer time, at seven o'clock when in harbour, and at half-past seven when at sea, or in the winter season ; the summer and winter to be considered as ascertained from firing the evening gun at eight or nine o'clock, after which the decks are to be swept, and the breakfast piped precisely at eight, unless the duty of the ship should prevent it. The hands to be afterwards called at three quarters past eight ; the chests moved or triced up to the decks ; the births swept and swabbed out clean, the ladders scraped, and the gratings taken off fore and aft. Sentinels are then to be placed at each hatchway, to prevent any person from going below till seven bells, at which time the decks are to be cleared, the work made up, and returned to the boatswain. If possible, the dinner is to be piped at twelve. If no particular service requires the ship's company sooner, they are

to be allowed one hour at dinner. The chests afterwards moved and the parts beneath them swept.

The lieutenant of the morning watch is to have the charge of the decks for the day, and to report the state of them to the commanding officer when the above-mentioned service is finished. In the absence of the lieutenant, the mate of his watch is to superintend and report the duty for him.

The wind-sails are to be constantly down, and when the surgeon judges it necessary, stoves are to be lighted. The between decks are to be washed every morning, if other duty does not interfere; but if it does, the following day is to be appropriated, and stoves are afterwards to be kept lighted till the decks are perfectly dry.

3d. On Saturday mornings, the ship's cooks are to be called at four o'clock, to boil water for washing the ship's company's clothes; the hands to be turned up at six and to continue washing till half past . Clothes-lines cut out of white line, are to be kept for that particular purpose by the boatswain's yeoman; the lines to be rove and marked off the preceding night, and the linen hung between the fore and main shrouds, in harbour, and between the main and mizen shrouds at sea. Should it rain before they are perfectly dry, they are to be taken down, and put into clean half tubs under the charge of the sentinel at the cabin door.

4th. At sea the ship's company is to be mustered at quarters and the lieutenants are to inspect and see that every thing is clear and ready for action, and afterwards report it to the captain. The ship's company is to be mustered, by divisions, at ; at which time the lieutenants are to examine and see that the men are clean and neat in their persons, or report the contrary to the commanding officer after he has inspected them. On the divisions are to be beat, and the officers are to see that the men have washed their dirty clothes, and that they have their complement complete. No man is to be allowed to convert any article of his wearing apparel to another use, without having first received the approbation of his officer of division.

5th. When the service will allow of leave being granted to the seamen and marines to go on shore, a regular list, in the prescribed form,* is to be kept and none are to be permitted but by the

* *Form of the list to be kept for men having leave to go on shore.*

Men's Names.	Day of the month when leave is granted.	Time when the person is to return.	Time when the person returns.

first lieutenant, or with his consent; and when the ship's company is allowed to have spirits from the shore, a list is likewise* to be kept in the form as directed, and no mess is to be allowed more than at the rate of half a pint to each man.

6th. The raw hands to be exercised at reefing and furling sails, one hour every day, till they are perfect in doing it. The boatswain's mates to have the superintendence of this duty by turns; and the same people are to be exercised by the gunner's mates in rotation, at the great guns, one hour in every day.

7th. When in harbour or at sea, and particular duty does not interfere, or when in company with a senior officer, who does not make the signal periodically mornings are to be appropriated to the exercise of the great guns and small arms; on which day every officer on the spot is particularly required to attend. If in harbour and the weather will permit, the sails are to be loosened and every evolution practised which may occur in action at sea.

8th. When in harbour, and particular duty on board prevents the motions of the senior officer from being followed, a message is always to be sent, specifying the reasons which so prevented it.

And when a commanding officer gets under weigh, his motions, if the weather will permit, are to be followed till he is clear of the harbour. When a commodore arrives in port, the sails are to be loosened and taken in, agreeable to his movements; but, should any strange ship appear off the harbour, no boat is to board them until it is ascertained that they are friends.

9th. When in harbour and other duty does not prevent it, the hands are to be turned up in the summer season at . The boats required for the duty of the ship are to be hoisted out, and the decks scrubbed and washed; the comings, ladders, channels, and gratings, are to be particularly well scrubbed, the yards squared, and hammock-cloths spread by seven o'clock. In the winter the hands are to be turned up at , and the decks cleaned by seven bells, when the hammocks are to be got up. These are always to be piped down after beating the retreat from quarters at sea, and after hoisting the boats in when at anchor.

* *Form of list to be kept for men having leave to bring Spirits on board.*

Men's Names.	Number of mess.	Number of men in mess.	Quantity granted.	Sum given.	To whom given.

10th. When in port and the duty of the ship will admit of the indulgence, a boat is to be ready at nine o'clock, every morning to carry any person (who may have permission) on shore; another boat to go at one, and another at a sufficient time before sun-set to admit of her return to the ship by that time. She is, on no pretence whatever, to be detained after that period.

11th. When any duty is to be performed out of the ship, where a part of the ship's company is required, an officer, with his division, is to be sent; and in like manner, when the service requires but a sub-division, a mate or midshipman, with his proportion of the company, is to be sent; always taking great care that the officers and ship's company are sent upon all duties in rotation.

12th. When in port the beer and water to be demanded from the victualling office is to arrive alongside on mornings; but when the ship is watered by the launch, she is always to be kept complete.

13th. On afternoons, if the duty of the ship will permit, the ship's company are to be ordered to mend their clothes.

14th. When the ship arrives from sea, the greatest despatch is to be used in refitting and getting ready for sea again; and until she is so, no officer or seaman is, on any account, to absent himself from duty. Watering the ship must always be considered as the first service to be attended to, for which purpose, different boats' crews are to be selected to relieve each other.

15th. When an officer receives leave of absence, he is to consider it for that day only, unless expressly stated to the contrary, as no person whatever is to sleep out of the ship without the captain's leave.

16th. The ship is never to be left without lieutenants, and mates, and midshipmen; or without one warrant officer, who, in the absence of the others, is to inspect the store-rooms and return the keys to the senior lieutenant.

REGULATIONS FOR THE INTERNAL GOVERNMENT OF A UNITED STATES FRIGATE.

Art. 1. The laws and printed regulations for the government of the Navy are to be most strictly conformed to by every person on board.

Art. 2. All officers are required to exact from their inferiors the most ready, unequivocal and respectful obedience to their orders, and it is required of all inferiors, that they do not neglect any ex-

terior mark of respect when they address or are addressed by a superior on duty.

Art. 3. All officers are enjoined particularly to notice the conduct of their inferiors; and should they witness any serious impropriety, give notice to the commanding officer.

Art. 4. All officers are required to preserve the strictest silence among those under their command, and to cause all orders to be executed with the greatest possible celerity, and without confusion.

Art. 5. As promptitude and alertness in the performance of duty can alone be acquired and preserved by continual attention, the officers will never suffer the most trifling duty to be performed with indifference.

Art. 6. Officers are required to particularize and distinguish those men who may excel in cleanliness, activity, and general good conduct, that all may be encouraged and induced to conduct themselves with propriety.

Art. 7. Officers and petty officers are required to make themselves personally acquainted with the ship's company, that they may always address them by their names.

Art. 8. No person is to be confined but by the order of the commanding officer.

Art. 9. As the great object of punishment is to prevent the repetition of offences, it should not only be inflicted in a public manner, but with as much formality as circumstances will permit, and always proportioned to the offence.

Lieutenants are permitted to punish petty offences not exceeding six lashes, with a piece of nine-thread worming.

Offences requiring severer punishment, to be always reported to the captain. No petty officers are to be struck but by order of the captain.

Art. 10. All officers attached to the ship must appear in their proper uniform, unless absent on furlough; and never to leave the ship on duty without side arms.

Art. 11. lieutenants only can be absent from the ship, on leave, at the same time. The first or second must always be on board.

Art. 12. No officer to remain out of the ship, after the watch is set in the evening, but by the permission of the captain.

Art. 13. No petty officer, seaman, or marine, to have permission to go on shore without the captain's leave, and having obtained it, the officer of the deck must see that they are clean and decent before they leave the ship.

Art. 14. No light must ever be unattended to in any sail room, store or birth, and none to be allowed in the hold, tiers or storeroom, but in lanterns.

Art. 15. All fire and light, on the birth deck, are to be extinguished at 8 o'clock at night in winter, and at 9 o'clock in summer. The lights in the steerage and cockpit to remain half an hour

longer and no later, and those of the ward-room to be extinguished at 10 o'clock, when they are to be reported to the commanding officer.

Art. 14. No lumber of any kind must be suffered to remain on the gun-deck, but it must at all times be kept as clear as possible for action.

Art. 17. No boat, except on very particular duty, is to be absent at meal-times; nor ever after sunset, except by the captain's permission.

Art. 18. Boats are never to be left without a boat-keeper; nor lie alongside, when not in use, but moored astern, or to the swinging booms, with fenders out.

Art. 19. Boats coming alongside, are to be searched by the master-at-arms or ship's corporal, and liquors found on them to be taken to the officer of the watch.

Art. 20. No shore boat to be allowed to come alongside after the watch is set in the evening, without the commanding officer's permission. Market boats never allowed to come alongside but by the captain's permission, and always searched before any intercourse with the crew is allowed.

Art. 21. Boats' crews are commanded, when their officers are not present, to obey the orders of their coxswain, who are strictly forbidden to carry any thing on shore without permission from the quarter-deck.

Art. 22. That the boats, their sails, and oars, may be kept in good order, each lieutenant will take charge of them as follows:

Launch and gig, 1st lieutenant,
First and third cutter, 2d lieutenant,
Second and fourth cutter, 3d lieutenant.

They will keep them in complete order for service, and report any deficiency to the first lieutenant.

Art. 23. Complaints of whatever kind that may be made by the ship's company, of the quantity and quality of provisions, are to be reported to the captain; and no alteration or deviation from the established allowance of provisions is ever to be allowed without the captain's immediate directions.

Art. 24. The magazine must not be opened but by order of the commanding officer, when every precaution must be taken to prevent accident by fire. The gunner must always attend, and the first lieutenant, except when opened for quarters.

Art. 25. No stores are to be sent out of the ship but by the captain's orders, and no stores are to be expended but by the orders of the first lieutenant or captain.

Art. 26. No clothes are to be left neglectfully about the decks, nor even in the tops, but all packed in the bags; nor are such clothes as may be found by sweepers or others, on any pretence, to be appropriated to their own use, but to be brought on the quarter-deck to the officer of the watch, who will direct a proper inquiry to be made for the owner.

Art. 27. The crew will furnish themselves with such articles of clothing as may be directed from time to time, as the climate and their health may require, and they are strictly forbidden to sell, exchange or convert any article, without permission from the officers of their division.

Art. 28. Washing days will be appointed as the weather and duty of the ship will admit, and the clothes are to be dried on lines stretched from shroud to shroud forward, or such other place as the commanding officer shall appoint. No clothes are to be hung up on any other than washing days, except by particular leave from the first lieutenant, when washing days may have proved rainy.

Art. 29. The clothes of all men run, or supposed to have run, is to be ordered by the commanding officer into the purser's store-room, a list of which is to be taken by the officer of the division to which they belong.

Art. 30. Officers of divisions will examine and take an account of the men's clothes belonging to their division on the last Thursday of every month, and send a list of such articles as may be wanted for their health and comfort to the captain immediately. The different divisions to be determined by the quarters to which the men belong.

Art. 31. The men of the different messes are every Sunday to appoint one of their messmates to keep the birth and mess kids clean and in proper order for the following week. Such men are to be responsible to the officer for any neglect he may discover, and none but men belonging to boats, when in port, are to be excused from this duty.

Art. 32. Twelve minutes, and no more, will be allowed from the time of piping hammocks up, till they are completely stowed; the same time will be allowed to take them down and hang them up. The hammocks belonging to people absent on duty are to be lashed and taken up by men birthed next without them; but if any outside men should be absent, then the man next within him is to perform that service. When the weather is so bad that the hammocks cannot be stowed in the nettings, they are to be taken down and piled in such places as the commanding officer shall appoint.

Art. 33. It is strictly forbidden to throw any dirt or dirty water out of the ports, but dirt of all sorts is to be taken to the head and lowered well down before it is started. It is forbidden to enter the ship, or get into the boats, through the ports, or down the sides, or any other way than the gangway-steps or stern-ladders. No men are allowed to lounge in the chains, boats, ports, or on the booms.

Art. 34. The people are expected to be cleanly dressed and shaved by 10 o'clock on every Sunday morning, when they will be mustered by their officers in the different divisions commanding them, who will examine them for general muster at half past 10 A. M.

Art. 35. Any person finding himself ill, is to make his complaint, without loss of time, to the surgeon, as no excuse for neglect of duty, on the score of illness, will be received but through the surgeon.

Art. 36. Drunkenness and quarrelling, being utterly subversive of discipline and good order, will never pass unpunished.

Art. 37. Any person having cause of complaint against any other person, will make it known to the officer of the watch, the first lieutenant, or captain, as the case may require.

Art. 38. The quarter-deck being considered as a military parade, no indecorous or improper behaviour is ever to be suffered or practised upon it.

Art. 39. None but those duties absolutely necessary, are to be performed on Sunday.

GENERAL ORDERS TO A SHIP'S COMPANY.

One washing day in a week will be always allowed both at sea and in harbour; it is therefore strictly forbidden that any water shall be appropriated to that purpose, but what may be served out.

The ship's company are to form themselves into messes of not more than six, or less than four persons;* the oldest man in each mess will be held responsible for the cleanliness and regularity of the birth, and the quietness of the other people belonging to it.† He is to make them take it by turns to clean the birth after every meal; and is to apply for any redress as to the provisions, or what may respect the concerns of the mess.

The following articles of clothing are to be always kept complete, if it be possible; namely, three shirts, two jackets, one (red or white) waistcoat, three pair of trousers, two pair of shoes, two hats, or one hat and one cap, and one black handkerchief.

‡The various disorders incident to people on board ship most commonly proceed from colds, acquired by wet clothes and foul air; it is therefore strictly commanded, that every man who gets wet, takes the first opportunity to dry his clothes, and that he never carries any thing which is wet below, but leaves it under charge of the sentinel at the cabin door, where dry tubs will be placed to receive such articles. Nothing is ever to be hung in the shrouds, or about the bowsprit and rigging, when in port; but,

* From ten to eight, otherwise there would not be sufficient births for the ship's company.

† The quarter-masters, captains of tops, and boatswains' mates, should be divided among the births and have charge of them.

‡ To have this order put in execution, the men's clothes should be marked in paint, according to their number on the ship's books.

should any person be desirous of drying his wet clothes, he will be allowed to hang lines between the fore and main shrouds for that purpose.

Any thing found lying about the deck, for which no owner appears, is to be brought aft on the quarter-deck, where every person who loses any thing is to apply.

The alacrity of the seamen in the performance of their duty, which reflects so much credit on their ship, and a quiet deportment when below, so essential to the happiness of both officers and ship's company, will be duly noticed: so that, whoever distinguishes himself by such a line of conduct, may depend on having a preference in every advancement and indulgence.

Any man, having cause of complaint, is to come quietly aft on the quarter-deck, and make it known to the officer of the watch; where every redress, consistent with the justice of the case, and the rules of the service, is assured. But no man is to presume, from litigious motives, to violate this regulation; as the person complained of will then become the injured party.

*Slops will be issued on the first Monday of every month; at which time all persons wanting them, are to apply to the officers of their division, who will, if necessary, grant them an order to receive them; but no man is to sell any of his clothes, or convert one article to the use of another, without having first received the consent of the officer of his division. If any man should lose any part of his clothing, he is immediately to report it to the officer of his division.

When boats are absent from the ship, without an officer, they are to be considered as under the immediate command of the coxswain, whose orders are to be equally obeyed. He will be responsible that a boat-keeper is always in the boat, to whose charge every thing belonging to the boat is to be committed.

No man is to presume to bring any liquor on board without particular leave.

When permission is granted for liquor to be brought on board, the people who may be desirous of having it, are to apply to the midshipman of the watch, who will report it to the first lieutenant, and if he thinks the service of the ship will admit of such an indulgence, a quantity may be admitted, not exceeding half a pint to each man, for a certain number of messes, which will be varied in their turns, and particularised according to their merits, and the use or abuse they make of it.

* The mate of each division should make out a list of slops wanted by the division and obtain the lieutenant's signature, and then to attend while the slops are served out, as a check upon the purser; and no slops can be charged against a man's wages without the purser's producing his vouchers.

REGULATIONS AND INSTRUCTIONS, RELATIVE TO THE UNITED STATES' NAVAL SERVICE.

Officers in general.

1. Every officer is to repair to the fleet, squadron, ship, or station, to which he shall be appointed, without delay, after receiving orders.

2. Every officer, from the time of his joining the squadron, ship, or station, to which he shall be appointed, to the time of his removal, is to be constant in his attention to his duty; never absenting himself except on public service, without the consent of his commander; nor shall he remain out of the ship during the night, nor after the setting of the watch, without having obtained express permission to that effect; neither shall he absent himself from the ship for more than twenty-four hours at a time, without permission of the senior officer present.

3. Every officer is directed to wear his uniform at all times while on public service; and it will be the duty of commanders and others to prevent any changes whatever from being made in that which now is, or hereafter may be, established for the navy.

4. Every officer is to conduct himself with perfect respect to his superiors, and to show every respect and attention to those under his orders, having a due regard to their situation; and invariably to demean himself, in every situation, so as to be an example of morality, regularity, and good order to all persons attached to the naval service. He will observe attentively the conduct of all under his command, encouraging and commending the meritorious, and censuring, punishing, or reporting to his superiors the misconduct of those who may deserve it.

5. If an inferior shall be oppressed by his superior, or observe any misconduct in him, he is not to fail in his respect towards him; but he is to represent such oppression or misconduct to the captain of the ship, or to the commander of the fleet or squadron in which he serves, or to the secretary of the navy, in writing.

6. Every officer is strictly enjoined to avoid all unnecessary expenditure of money or stores belonging to the public, and, as far as may depend on him, to prevent the same in others.

7. Every officer is strictly enjoined to report to his commander, or to the secretary of the navy, as circumstances may require, any neglect, collusion, or fraud, discovered by him, in contractors, agents, or other persons employed in the supplying of ships with provisions or stores, or in executing any work in the naval department, either on shipboard or on shore, whether or not such provisions or stores are under his own charge, or such work under his own inspection, or that of any other officer. But in making such representations, he will be held accountable for all vexations and groundless charges exhibited by him in manner aforesaid.

8. Every officer is strictly forbidden to have any concern or interest in the purchasing of, or contracting for, supplies of provisions or stores of any kind for the navy, or in any works for or appertaining to it: neither shall he receive any emolument or gratuity of any kind, either directly or indirectly, on account of such purchases, contracts, or works, from any person or persons whatever.

9. Every commander of a fleet, squadron, or single ship, before he leaves his command, is to sign all books, accounts, and certificates, which may be necessary to enable officers to pass their respective accounts, or to receive their pay; provided he be satisfied that such books, accounts, and certificates are correct; as he will be held accountable to the Secretary of the Navy for all errors and improprieties appearing in papers bearing his signature.

10. If any officer shall receive an order from his superior, contrary to the general instructions of the secretary of the navy, or to any particular order he may have received from the said secretary of the navy, or any other superior, he shall represent in writing, such contrariety to the superior from whom he shall have received said order; and if, after such representation, the superior shall still insist upon the execution of his order, the officer is to obey him, and to report the circumstances to the commander of the fleet or squadron, or to the secretary of the navy, as may be proper.

11. The pay of every officer shall be held answerable for any loss, embezzlement, or damage, occurring through neglect of the public stores, and for all unnecessary expense.

Commanders of Fleets or Squadrons.

1. Every officer appointed to the command of a fleet or squadron shall obtain, as soon as possible, the most correct information of the state, qualities, and number of the ships and crews under his command; the order and discipline observed in them; the quantity and quality of provisions and stores on hand, and their fitness for the service intended. He shall acquaint himself also with the skill, capacity, and information of the commanders and other officers, that he may be enabled to select, for particular services, those best qualified by their peculiar abilities and sound knowledge, to perform them. He shall use every exertion to equip expeditiously the fleet or squadron, and report to the board of navy commissioners any defects he may discover in the ships or their supplies, which may unfit them for the service intended.

2. He shall not exercise any authority in a dock or navy-yard, nor order any supplies of stores beyond the established quantity, nor any repairs to be undertaken in any ship; but he shall represent whatever he may think necessary to the commandant of the

dock or yard, or, should the case require it, to the secretary of the navy, or the navy commissioners.

3. He shall keep the fleet or squadron in the most perfect condition for service that circumstances will admit of, and make their repairs, as far as may be in his power, by the artificers and others belonging to the ships under his command.

4. He shall take every favourable opportunity to exercise the ships under his command, in performing all such evolutions as may be necessary in the presence of an enemy; and on all occasions he is to be careful that a proper example of alertness and attention is shown to the fleet or squadron by the ship which carries his flag.

5. He shall be attentive in battle to the conduct of every ship or officer under his command, in order that he may be enabled to correct their errors and prevent any bad effects from misconduct, and to make a true statement, to the end that they may be rewarded or punished as their conduct may really deserve.

6. He shall direct the crews of the respective ships under his command to be frequently mustered, and cause inquiries to be made into the qualities of the men, and their fitness for the stations in which they may be rated.

7. He shall inspect into the state of every ship under his command, and the order, discipline, and attention to cleanliness, and the modes adopted for the preservation of health, and the degree of attention paid to the regulations and instructions of the navy.

8. He shall not order any commander to take on board passengers, or to have supernumeraries, unless there should be strong reasons for so doing; and in such case he shall state his reasons in his order for that purpose.

9. He shall inform the secretary of the navy of all his proceedings relative to the service upon which he may be employed.

10. He shall correspond regularly with the secretary of the navy, as well as with the board of navy commissioners, informing them of all orders given by him relating to the duties respectively connected with his command; and it shall be his duty to point out such naval improvements as his observations may enable him to suggest, and such defects and neglects as may come under his notice.

11. When it shall become absolutely necessary to suspend from employment an officer having charge of stores, he may appoint another to act in his stead, until the pleasure of the secretary of the navy be known. He shall report, by the first opportunity, an account of the circumstances which may have caused the suspension, and order a survey to be held, and an inventory of the stores to be taken; one copy of which he shall forward to the navy department, and another he shall deliver to the officer taking charge of the stores, who will open accounts of the receipts, returns, conversions, and issues, from the period of closing the survey.

12. He may, in like manner, and for good reasons, suspend from their stations the captains or other officers under his command, on a foreign station, and appoint others to act in their places until the pleasure of the secretary of the navy be known; but in these cases he shall immediately transmit an account thereof to the secretary of the navy, specifying his reasons for so doing, and furnish the captain or other officer with a duplicate of the same.

13. No officer, within the United States, shall be arrested without the sanction of the department. When complaint is made against any officer, his commanding officer may, at his discretion, suspend him, until the directions of the secretary of the navy are received; and it shall be the duty of the commanding officer, forthwith, to furnish to the department, through the proper channel, a statement of the charges against him, with the names of the witnesses by whom they are to be proved, and facts to be proved by each witness. The officer suspended shall also be furnished with a statement of the charges against him, and directed to furnish to the commanding officer, to be forwarded to the department, such explanatory statement as he may wish to make, with the names of the witnesses by whom it is to be supported.

14. He shall not, without good and sufficient reasons, to be immediately communicated to the secretary of the navy, alter the appointments assigned to officers at the period of fitting out.

15. He shall preserve the instructions and orders received by him, and all other papers and correspondence relating to the service upon which he may be ordered in the most intelligible form; and at the end of every cruise he shall send to the secretary of the navy a narrative of his proceedings, accompanied by a fair copy of such official correspondence as may have any connexion with the facts therein stated.

16. He shall conform to the standing rules of the navy, in such directions as he shall give to established agents, and incur no expense that the public service does not render absolutely necessary.

17. He shall have no private interest in the procurement of stores or provisions for the public service, nor in any way interfere with the purchase or procurement of them, where there are proper officers for that purpose, except when an absolute necessity arises from making use of his credit or authority to obtain them.

18. He shall not make any alterations in the arrangements or emoluments of established agents, nor alter the pay or allowance of artificers or others employed in any department, nor order any additional number to be employed, except when the urgency of some particular service shall require it, nor direct any additional works or repairs, alterations or improvements to be undertaken in the docks, hospitals, or other places on shore. But he may suggest to the secretary of the navy, or to the board of navy commissioners, the necessity for such works, repairs, &c. or direct the proper officer to make the requisite report and estimate of ex-

pense; and in such case he shall certify as to the correctness of said estimate and report.

19. He shall obey all orders received from the secretary of the navy, and the board of commissioners of the navy, and exact a strict attention to them from all persons under his command.

20. In the purchase of provisions or stores at places where no regular agent is established, he may appoint one for the purpose of obtaining the necessary supply, and he may himself contract for the whole quantity required, or direct each captain to purchase what the ship under his command may require: but in either case, the amount of the bills drawn will be charged to his account until satisfactory vouchers are received to show that the articles were of a suitable quality, and purchased at the lowest rates.

21. He shall, as far as may be practicable, wherever no regular agent may be established, have the public works which it may be necessary to have done, on contract, executed at the lowest rates, giving public notice that tenders may be received from those disposed to contract: copies of which contracts shall be sent by him to the secretary of the navy, and the board of navy commissioners.

22. Should the duties of the dock or yard require more men than those usually employed in them, the commander of the fleet or squadron shall, on the requisition of the commandant of the yard, whenever the duties of the fleet or squadron shall admit of it, order as many officers and men as may be required, from the ships for that service; but he will take especial care that no more are sent than may be absolutely necessary and useful.

23. Each of the petty officers thus sent from the ships, shall receive eighteen cents, and the men twelve cents per diem, in addidition to their pay and rations.

24. No boats or vessels shall be hired for the use of the fleet or squadron, without the consent of the commander, and he will be careful that such consent is not given except when the service required cannot be performed by the boats of the ship under his command.

25. Foreign agents are to be paid by bills drawn on the secretary of the navy, at the regular rate of exchange, unless otherwise instructed by the secretary of the navy, or bills may be disposed of and the proceeds applied toward reimbursing them: but in either case the certificates of three respectable merchants, and the approval of the commander of the fleet or squadron, must be forwarded with the letter of advice. These bills shall, in all cases, be drawn by the pursers of the respective ships for the amount of the provisions or stores received, and approved by the commander of the fleet or squadron, or by the captain of the ship when acting separately.

26. The commander of a fleet or squadron shall direct frequent examinations to be made into the hospital establishments and sick quarters under his command, and cause every attention to be paid

to the comfort of the sick. He shall cause the examining officers to make him a written report of their state and condition.

27. Should the commander of a fleet or squadron be killed or disabled in battle, his flag shall continue flying while the enemy remain in sight, and the officer next in command shall be informed thereof, and take command of the fleet.

28. On the death of the commander of a fleet or squadron, the officer who succeeds him shall enjoy all the pay and emoluments of commander, in the same manner as his predecessor, until the pleasure of the secretary of the navy be known; but he is not to assume any badge of distinction or hoist any flag which his rank does not entitle him to.

29. The commander of a fleet or squadron shall not resign his command or quit his station unless the bad state of his health shall render a change of climate or situation absolutely necessary; and in such case he shall not weaken the fleet or squadron by taking from it a vessel, the service of which may be necessary.

30. When the commander of a fleet or squadron shall resign his command, he shall deliver to his successor the originals of all secret instructions, orders, and signals, authenticated copies of all other unexecuted instructions and orders, together with such information as may be in his possession relative to the service to be performed.

31. In the absence of the commander of a fleet or squadron, the senior officer shall be governed by the foregoing instructions, and shall superintend the various duties to be performed; for the due execution of which he will be held responsible.

Commanders of Squadrons or divisions of Ships.

1. Officers having command of squadrons of the fleet will superintend, with great attention, their respective squadrons, will see that the crews are properly disciplined, that all orders and regulations are strictly attended to and obeyed, and the crews exercised; that the provisions, stores, and water, are kept complete and in good order; that the ships and crews are kept, in every respect, fit for service, and that every precaution is taken for the preservation of health on board.

2. They will be held responsible to the commanding officer, to whom they will make reports of the state and condition of their squadrons, and all applications for supplies and repairs, as well as of all other matters relating to them.

3. When squadrons shall be divided, the commander of a division shall be equally accountable to the commander of a squadron.

4. The commander of one squadron or division may correct, by signal or otherwise, the mistake or negligence of a ship in another squadron or division, whenever it is probable, that from their relative situations, that ship cannot be seen distinctly by the flag officer commanding the squadron or division to which it belongs;

or whenever, being in the presence of an enemy, the officer commanding that squadron or division, whatever may be his situation, does not himself immediately correct such negligence or mistake.

5. Commanders of squadrons or divisions will, after battle, call on their captains for reports, and will afterwards report to their commander the conduct of those under their command; and if, during battle, they should perceive any ship of any squadron or division evidently avoiding battle, or not doing her duty, they are to send an officer to suspend the captain of that ship, and to take command of her. If the ship does not belong to the division of the commander who makes these observations, he is to give the earliest information to the commander of the squadron or division to which such ship may belong.

6. A commander of a squadron, having under his command, six ships of a rate not below that of a frigate, and acting under separate orders from the secretary of the navy, shall be entitled to an officer of the rank of captain to assist him in regulating the details of his squadron.

7. A commodore or commander of a division, having under his command four ships of a rate not below that of a frigate, shall be entitled to an officer of the rank of master commandant, who shall, while performing this service, receive the pay and emoluments of a captain of a frigate of the second class.

8. All orders and instructions issued by the captains or masters commandant aforesaid, shall be given as orders of the commander of the fleet, squadron, or division, and shall be obeyed by those to whom they are addressed, in like manner as those issued by the commander himself in his own name. But they shall never issue an order, or make any change or arrangement whatever without directions from the commander, unless some very urgent necessity shall require it.

9. Returns, applications, and reports, relating to the ships of the fleet, squadron, or division, are to be delivered to each of the captains or masters commandant aforesaid, to be by him laid before the commander.

10. All orders and instructions relative to the duties of the commander of the fleet, squadron, or division, will equally apply to the aforesaid captain or master commandant; whose duty it shall be to attend to, and enforce in, the fleet, squadron, or division, to which he may be attached, every rule and regulation of the navy of the United States.

Of Appointments.

1. No commander of a fleet, squadron, division, or single ship, while in the United States, shall order any commission or warrant officer to any ship under his command without being authorized by the secretary of the navy: nor shall he give acting appointments, or make any changes whatever in the arrangement and distribution

of the officers of the navy, without the approbation of the secretary of the navy.

2. On foreign stations, a commander may, when absolutely necessary, give acting appointments to fill the vacancies which may be occasioned by death or other circumstances; but in such cases, he shall take the earliest opportunity to make the circumstances known to the secretary of the navy, and state his reasons for making such acting appointments.

3. A master commandant must serve in active employ, as such, one year, before he can be promoted to a captain.

4. A lieutenant must serve in active employ as such, two years and six months, before he can be promoted to a master commandant.

5. A midshipman, before being promoted to the rank of a lieutenant, must be 18 years of age, have served two years at sea, be acquainted with the manner of rigging and stowing a ship, the management of artillery at sea; arithmetic, geometry, trigonometry, and navigation. He must also know how to make astronomical calculations for nautical purposes, and pass an examination on all those points before a board of navy officers, to be appointed by the secretary of the navy for that purpose; by whom the morals and general character of candidates will be inquired into.

6. Candidates for examination and promotion are to send in their applications to the secretary of the navy, on the 1st day of October and on the 1st day of March, every year; and they will be informed of the place or places, where examinations are to be held, either by letter or through the medium of the public prints.

7. If any person shall produce false certificates of age, term of service or character, such person shall, whenever it may be discovered, and whatever may be his rank, be dismissed from the navy of the United States, and be ever after rendered incapable of obtaining an appointment in it.

8. No person shall be appointed master, until he shall have passed an examination on all points of seamanship and nautical astronomy, and rendered to the examiners the most satisfactory proofs of his morality, and of his capacity to perform the duties which may devolve upon him.

9. Masters of extraordinary merit and for extraordinary services may be promoted to lieutenants.

10. No warrant as boatswain or gunner of a ship of the United States's navy, shall be given to any person who shall not have acted one year in such capacity, and produced satisfactory certificates of his good conduct and qualifications.

11. On foreign stations, an officer commanding a fleet or squadron, may give orders for the examination of candidates for promotion, where they may appear entitled to it by their abilities and services; and in these cases, he shall employ three captains on this service, whose certificates shall, without delay, be transmitted to the secretary of the navy, after the candidates who have passed an examination, have been furnished with duplicates thereof.

12. When acting appointments become necessary, they shall be conferred upon those who have passed their examination, if any such there be.

13. If an inferior officer, whatever be his rank, succeeds to the command of a ship, in consequence of the death or captivity of the captain and others, he may make temporary appointments to supply the places vacant; and until he can bring the ship into port, or deliver her up to a senior officer of the navy of the United States, or receive the instructions of the secretary of the navy, he shall receive the pay of captain, and those acting under his appointments shall receive the pay of the officers whose ranks they have respectively filled.

14. No captain, whose date of commission is less than three years' standing, except under extraordinary circumstances, or cases of necessity, shall command a frigate of the first class.

15. No captain, whatever may be the date of his commission, shall command a frigate, unless he shall have previously commanded a sloop of war in active service for six months.

16. Slaves are not to be borne on the books of the vessels of the United States; nor shall any person compose part of the crew of any vessel of the United States, who has not voluntarily entered the service.

Of Stores and Provisions.

1. The signature of the captain shall be affixed to all papers having a reference to the expenses of the ship.

2. On taking the command, he shall demand of his predecessor, or the navy store-keeper, an inventory of all the articles furnished to the different departments of the ship from the navy stores, and if he command the ship until she is paid off, he shall send such inventory with his accounts to the fourth auditor of the treasury.

3. He shall cause a careful examination to be made of all articles received on board, for the use of the ship, and if he fail to do so, will be alone accountable for any evils resulting from the defects or deficiencies in them, provided such defect or deficiencies were passed over at the receipt of the articles, from want of a due examination thereof.

4. He shall not, at any time, stop any vessel, lighter, or boat, going with provisions, water, or stores, to another ship; nor take such provisions, water, or stores for the ship under his command, except there be a most urgent and absolute necessity for so doing; and of this, he shall, without delay, inform the commanding officer present, and the captain of the ship to which such provisions, stores, or water were going.

5. When the duties of the ship will admit of it, he shall permit the purser to use the boats for the purpose of conveying on board provisions, stores, and other necessaries for the use of the ship.

6. A captain, when serving abroad, and not under a superior

officer, will transmit to the board of navy commissioners timely notice of such stores and provisions as the ship he commands may require, accompanied by a survey of those on hand; and he is not to purchase any except under absolute necessity.

7. He shall not permit his stores to be applied to private uses, wasted, or, without absolute necessity, converted to other purposes than those for which they were intended; and whenever he shall think it necessary to order any extraordinary expenditure or conversion of stores or provisions, his order for that purpose shall be given in writing, stating the reason or reasons for such extraordinary expenditure or conversion; which order shall be preserved and produced by the officer having charge of the stores so expended or converted, at the settlement of his accounts.

8. If any stores or provisions shall be lost, destroyed, or embezzled, the circumstances shall be noted in the log-book of the ship; and if, through neglect or design, they should be totally, lost, they shall be charged to the offender, and he be brought to punishment.

9. He is to use the utmost economy in every thing which relates to the expenses of his ship and the public service confided to him, using every article for the purpose for which it was originally intended, and making his supplies and means last as long as possible. He is not to use sails for covering boats, nor for awnings, nor to convert canvass into sails not allowed for the service, nor to any other purpose than that for which they were supplied, unless they shall have first been surveyed, and reported unfit for their proper use; nor shall he make any alterations in the ship under his command without the permission of the board of navy commissioners.

10. He will examine the weekly returns of expenditures, and with the master sign those made monthly, which, when so signed, are to be delivered to the officers having charge of stores, to be presented by them at the settlement of their accounts.

11. He may grant to private ships of the United States, and to foreign ships, when absolutely necessary, such supplies of provisions and stores as they stand in need of, giving the officer, having charge of them, written orders to that effect, and taking from the master or commander of the vessel so supplied, three receipts and three bills of exchange, drawn in favour of the secretary of the navy on his owner, or those concerned in the ship, for the real amount of the articles furnished; which bills, and two of the receipts, shall be transmitted to the secretary of the navy, and the circumstances noted on the accounts and log-book of the ship.

12. When it becomes necessary to purchase stores, they shall be delivered to the proper officers of the ship, who shall sign receipts for them, and they are to be charged at their cost, by the purser of the ship against such officers in their accounts, and such charge or charges shall be transmitted to the fourth auditor of the treasury, to stand against their pay until accounted for.

13. Stores received from navy yards or other establishments, having navy store-keepers or other proper officers to attend to the issuing and valuation of them, are in like manner to be charged at their real value, to the respective accounts of the officers having charge of them, and these charges, as in the preceding article, are to be transmitted to the fourth auditor of the treasury, to stand against their pay, until such stores shall be satisfactorily accounted for.

14. On the death of an officer having charge of stores, his public papers shall be separated from those of a private nature, the former to be forwarded by a safe conveyance to the fourth auditor of the treasury, and the latter, together with his private effects, to be put in charge of such officer as the captain of the ship may appoint for that purpose, to be preserved for the benefit of the legal representatives of the deceased, unless, from particular circumstances, the captain should deem it adviseable to dispose of them at public sale; in which case a duplicate of the inventory, with an account of the disposal or sale, shall be transmitted to the fourth auditor of the treasury.

15. If an officer, having charge of stores, should, from any accidental circumstance, be separated from his ship, the captain shall proceed to survey and ascertain the state of the stores, as though such officer were actually dead or discharged; and he shall, as in a like case, appoint another officer to act in his place, giving the earliest intelligence of his proceedings to the fourth auditor of the treasury.

16. He shall carry to sea with him the established number of boats and stores, and not depart from this rule without the consent of the secretary of the navy, or of the board of navy commissioners.

17. When a ship cuts, slips, or parts her cable, the captain shall, as soon as circumstances will admit, endeavour to recover the anchor or cable lost; and should it appear that no exertion for that purpose was made by him, the value of the articles will be charged against his pay. If the ship puts to sea without recovering them, the senior officer present shall endeavour to recover them; but no vessels are to be hired for that purpose, if the boats and crews of the squadron are able to effect it. If neither of them, however, have an opportunity of recovering them, the captain of the ship, whose cable was thus cut, slipped, or parted, shall, without delay, give an account to the board of navy commissioners, to the commander in chief, or to the commandant of the nearest yard; taking care to state particularly the bearings and distances of the most suitable places to mark the spot where the anchor lies, to the end that means may be immediately adopted for recovering it.

18. While in port, it shall be his duty to prevent embezzlement of stores from the ship under his command, from ships in ordinary, and from the dock and navy yards; as well as all other practices

of a fraudulent nature, tending to affect the interests of the United States.

19. He shall attend with all the officers of his ship, when the crew is paid off, and examine carefully, to discover if any articles are concealed with a view to embezzlement; and report to the secretary of the navy and the board of navy commissioners the character of each officer serving under him, particularly as to his sobriety, diligence, activity, and abilities; leaving a copy of that part of his report relating to the conduct of such of the officers as are to remain with the ship, in the hands of the commandant of the yard.

Of Fitting and Refitting a Ship.

1. When a captain is appointed to a ship in dock or ordinary, he shall visit her throughout, in company with the officers of the yard, ascertaining her qualities, trim, and condition; and shall receive from the commandant of the yard, communications as to the orders he may have received from the board of navy commissioners, relative to the repairs or alterations necessary to be made.

2. He will give every aid in forwarding the work of the ship, informing the board of navy commissioners of any neglect he may observe, and make to them a weekly report of the progress of the equipment.

3. A captain, when not under the immediate command of a superior, shall be held responsible for all accidents arising from negligence, during his absence from the ship he commands, where his presence might have prevented such accidents, unless he be absent on public duty, or by permission of the secretary of the navy. He shall also be held responsible for all accidents arising from the absence of the officers and crew of the ship he commands, unless they be absent on public duty, or by permission of the secretary of the navy.

4. When the ship goes into port to refit, he is to order a minute and careful survey of all stores, &c. and call upon the warrant officers to prepare lists of all such as are damaged, or require to be replaced. He is to inform himself of the regulations of the dock-yard, and conform thereto. He will give to the officers of the yard previous notice of his intention to receive or return stores; and when the orders he is under require the attendance of the store-keeper and clerks out of their usual working hours, he will give them due notice of the same.

REGULATIONS FOR THE PROMOTION OF DISCIPLINE, CLEANLINESS, &c.

1. The captain is to allow every officer to possess the cabin allotted to him by the board of navy commissioners, and not to order more cabins to be made, nor to alter those already put up, without their consent, or the consent of his commanding officer.

2. He is to order sentinels to be posted at the entrance into the magazine and store-rooms, and at such other places as may be necessary, that no lights be taken below where danger may be apprehended, unless in good lanterns ; and he is to be careful in the adoption of every precaution to guard against fire.

3. He is not to suffer any, except the most careful of the officers and men, to have births or to sleep in the orlop or cable tiers, in which lights are never to be used without his express permission, and then in good lanterns ; nor is he to allow any person to smoke tobacco in any part of the ship except the galley. He is strictly to forbid the sticking of candles against the beams, the sides, or any other part of the ship ; to enjoin it upon the officers never to read in bed by the light either of lamps or candles, nor to have any lights in their cabins without some person to attend them ; to cause the funnel hole to be well secured by lead or otherwise, and the funnels to be cleaned every morning before the fires are lighted ; to cause all fires to be extinguished and lights to be put out at the setting of the watch, by the master-at-arms, and ship's corporal, except such as he shall permit to be kept burning; and to give the most positive orders, and most rigidly to enforce them, that no lighted candle be carried into the spirit-room, on any pretext whatever, whilst drawing or pumping of spiritous liquors, which duty shall be performed only by day, except on great emergencies occurring in the night.

4. He is not to suffer any person whatever to suttle on board, nor to sell any kind of beer, wines, or spiritous liquors on board to the ship's company. He is not to allow the men to sell, exchange, or in any manner dispose of the slop-clothes or bedding with which they are supplied ; and as far as possible to prevent any traffic amongst them, that would induce them to draw from the purser tobacco, sugar, tea, slop-clothes, or any other articles in larger quantities than are usually supplied.

5. He is to be particularly attentive to the comfort and cleanliness of the men, directing them to wash themselves frequently, and to change their linen at least twice every week. He is never to suffer them to sleep in wet clothes or wet beds, if it can possibly be avoided ; and to cause them frequently, particularly after bad weather, to shake their clothes and bedding in the air, and to expose them to the sun and wind.

6. As cleanliness, dryness, and pure air, essentially conduce to health, he is to exert his utmost endeavours to ensure these to

the ship's company in the most extensive degree. He is to cause the upper decks to be washed every morning, and the lower decks as often as may be necessary, when the weather will admit of their being properly aired and dried; to be swept every meal, and the dirt to be thrown overboard. He is to cause the hammocks to be carried on deck, and the ports to be opened as often as the weather will permit, and no more chests or bags to be kept on the lower gun-deck, than may be necessary for the comfort of the men; so that as few interruptions as possible may be opposed to a free circulation of air. He is to cause the wind-sails and ventilations to be kept in continual operation, the ship to be pumped out daily; and, when necessary, fires to be kindled in stoves for the purpose of removing the dampness of the lower guns.

7. When a ship is first put in commission, and before the crew, provisions, and stores, are received on board of her, she is to be perfectly cleansed, and fires to be kindled for several successive days in the hold and on the birth-deck, for the purpose of dissipating moisture; the beams, sides, and carlings of the birth-deck and the hold, are then to be whitewashed, and well dried before use; and this practice of whitewashing is to be continued afterwards, as often as may be necessary and proper.

8. The lower decks of a ship are always to be dry-rubbed with sand in preference to washing, and scrapers are never to be used when the use of them can be avoided; but should the occasional use of water become necessary, the decks are, after washing, to be well swabbed and dried with stoves, before the men are permitted to go below.

9. In summer, or in tropical climates, bathing should be encouraged, three times every week; and with this view, bathing-tubs should be placed on the forecastle or in the chains.

10. The clothing issued to the men is to be suitable to the seasons. But the wearing of flannel shirts is to be encouraged and permitted at all seasons, and in all climates.

11. When men are employed in washing the decks, they are to be barefooted and their trousers rolled up.

12. In rivers, the men are not to be permitted to drink the water alongside the ship, but casks are to be filled with the water, if fresh, and the mud and other impurities allowed to settle, before it is used.

13. Before casks are filled with water for sea-service, they are to be properly soaked and cleansed; and the water with which they are filled, must be of the best quality that can be procured, and free from all impurities.

14. When a ship anchors in the vicinity of marshes in a hot climate, the men should never be turned to duty before the rising, and never continued thereat after the setting of the sun, if it can possibly be avoided without any serious injury to the service. In such situations, and on wooding and watering parties, they should never be allowed to leave the ship, when there is a probability of

their being on shore all day, without taking with them their rations of food and liquor, and as soon as they return on board, they are to be compelled to put on dry clothes.

15. The practice of detaining boats on shore for officers, after night has set in, is strictly prohibited.

15. On cruises of unusual duration, and particularly in hot climates, ships are to be supplied with lemon acid, which is to be administered twice a-week to the crew, in such quantities as the surgeon may deem proper.

17. On receiving newly recruited men, the captain will cause an examination into the state of their persons and clothing, and use every measure to guard against the introduction of filth and contagion on board the ship.

18. As soon as possible after the ship's company is received on board, he will, with the assistance of the senior lieutenant, master, and boatswain, (and of the gunner and carpenter for their crews,) proceed to examine and rate them according to their abilities, which he is to do without partiality or favour. He is to rate as petty officers, those only who shall be found qualified for such stations, and to take especial care that every person in the ship, without exception, does actually perform the duties of the station in which he is rated. He shall rate none as ordinary seamen who have not been previously at sea twelve months, and are able to go aloft and perform some of the duties of seamen, nor shall he rate any as able seamen who have not been previously at sea three years, and are capable of performing most of the duties of a seaman.

10. He is, without loss of time, to make arrangements for quartering the officers and men; distributing them to the guns, musketry, rigging, &c.; to divide them into watches; make out his quarter, station, and watch bills, with bills of the names of men stationed at every gun; to muster and exercise them frequently at the great guns, small arms; bending and unbending, loosing, reefing, and furling sails; sending up and down topgallant masts and yards, rowing in boats, and every other duty which it may be necessary for seamen to perform both at sea and in port.

20. As occasions may frequently occur on which it may be necessary and of great importance that seamen should be skilful in the use of muskets, the captain is to order a number of sailors to be exercised and trained up to the use of small arms. The following shows the number to be thus trained on board of the respective rates of vessels:

A 74 gun ship	200 sailors
44	120
36	100
32	90
Sloops	65
Brigs	35
Schooners and cutters, each	30

The junior lieutenant, aided by the master-at-arms and ship's corporal, is to have the charge of this duty, and they are to be particularly instructed to teach them only the most simple motions of loading, firing, and forming lines; endeavouring at the same time, as much as possible, to render the exercise pleasing to the men, and to do away that prejudice which sailors always feel against the discharge of any portion of what they conceive to be the duty of a soldier. They are also to be taught the use of the cutlass and pike, and to be exercised in the various modes of boarding a ship.

21. To make men perfect in the use of the great guns and small arms, an expense of powder and ball is indispensably necessary; therefore, there will be allowed for exercise, every month for six months after receiving the crew and guns on board, as many round shot and as many cartridges, for the great guns, as will amount to a full broadside; and as many ball-cartridges for the muskets as will furnish each man, training, with twelve, and as many blank cartridges as will furnish them with twenty-four; but, after the first six months, only half the quantity is to be furnished.

22. The words of command for the exercise of the great guns, shall be as follows:

Silence.
Cast loose your guns.
Level your guns.
Middle your breechings.
Take out your tompions.
Take off your aprons.
Prick and prime.
Lay on your aprons.
Handle crows and handspikes.
Point your guns at the object.
Level your guns at the object.
Blow your match.
Take off your aprons.
Fire.
Stop your vents.
Spunge your guns.
Return spunge.
Load with cartridge.
Wad to cartridge and ram home.
Shot your guns.
Wad to shot and ram home.
Return rammer.
Put on your aprons.
Man your side tackles.
Run out your guns.
Level your guns, &c. as above.

It is to be observed, that when training tackles are used instead

of crows and handspikes, the words are to suit the case ; the same will apply when locks are used instead of matches.

23. The ship's company are to be divided (exclusive of marines) into as many divisions as there are lieutenants and masters allowed to the ship, and the divisions are to be as nearly equal in number as circumstances will admit. A lieutenant or master is to command each division, and to have under his orders as many master's mates and midshipmen, as the number on board, when quartered, will admit. He is again to subdivide his division into as many subdivisions as there are mates and midshipmen fit to command them under his orders, and to give to each of them, the command of a subdivision ; but he is to attend to, and be responsible for, every thing relating to the conduct of the men who constitute the division under his command ; to be present at all their exercises ; to examine into the state of their clothes and bedding ; to see that they keep themselves as neat and clean as the duty of the ship will admit ; to prevent swearing, drunkenness, and every other immoral practice ; to use every exertion to procure for them such comforts as the nature of the service and the duty they are employed in will admit ; to see that the master's mates and midshipmen give every aid in the performance of their duties ; and to report to the captain such of the men as they may find ignorant, idle, dirty, and profligate, to the end that they may be instructed, exercised, or punished, as circumstances may require. The marines are also to be divided into equal divisions, and each division is to be commanded by a subaltern, under the direction of the captain of marines, if there be one on board—which subaltern is to attend to, and be responsible for, the conduct of the division under his command, and for the good condition of their arms, which he is very frequently to inspect.

24. No captain shall carry any woman to sea, without an order from the secretary of the navy, or from the commander of the fleet or squadron to which he belongs.

25. Every captain is required to make himself acquainted with every coast and harbour he may visit, and, if practicable, to make charts and drawings of them, provided it can be done without giving offence ; all of which he is to forward to the board of navy commissioners, accompanied with a journal containing such remarks, descriptions, and information as he may think necessary to give. He is to endeavour to ascertain correctly the latitude and longitude of places little known, the prevalent winds and currents, the soundings, &c. as well as every other information that may be of importance to those who visit the place after him. He will also encourage, and offer every facility to such of his officers as are desirous of entering into similar occupations and pursuits ; and if any such journals or charts containing observations or remarks which may contribute to the improvement of geography, by ascertaining the latitude and longitude, fixing or rectifying the position of places, the heights and views of land, charts, plans, or

descriptions of any port, anchorage, ground, coasts, islands, or danger little known ; remarks relative to the direction and effects of currents, tides, and winds, the officers or persons appointed to examine them, will make extracts of whatever may appear to merit preservation, and after these extracts have been communicated to the officer or author of the journal from which they have been taken, and that he has certified in writing to the fidelity of his journal, as well as of the charts, plans, and views which he has joined to it, the same shall be signed by the officers and examiners, and transmitted with their opinion thereon, to be preserved in the depot of charts, journals, and plans.

26. Whenever he is to sail from port to port, in time of war, or appearance thereof, he is to give notice to merchant vessels bound his way, and take them under his care, if they are ready ; but not to make unnecessary stay, or deviate from his orders on that account.

27. He is, by all opportunities, to send an account of his proceedings to the secretary of the navy ; and he is to keep up a punctual correspondence with all public officers in whatsoever concerns them.

28. He is not to go into any port, but such as may be directed by his orders, unless by absolute necessity, and then not to make any unnecessary stay. If employed in cruising, he is to keep the sea, the time required by his orders, or give reasons for acting to the contrary, to the secretary of the navy.

29. Upon all occasions of anchoring, he is to take great care in the choice of a good birth, and to examine the quality of the ground for anchoring where he is a stranger, sounding at least three cables' length around the ship.

30. Upon his own removal into another ship, he is to show the originals of all such orders, as have been sent to him and remain unexecuted, to his successor, and leave with him attested copies of the same.

31. He is to leave with his successor a complete muster book, and send all other books and accounts to the officers to whom they respectively relate.

32. In case of shipwreck or other disaster, whereby the ship may perish, the officers and men are to stay with the wreck as long as possible, and save all they can.

34. When any men borne for wages are discharged from one ship to another, the captain of the ship from which they may be so discharged, is immediately to send pay lists of such men to the fourth auditor of the treasury ; and the purser of the ship from which they are so discharged, is also to supply the purser of the ship to which they are transferred, a pay list, stating the balances respectively due them.

34. He is responsible for the whole conduct and good government of the ship, and for the due execution of all regulations which concern the several duties of the officers and company of the ship,

who are to obey him in all things which he shall direct for the service of the United States.

35. He is answerable for the faults of his clerk, nor can he receive his wages without the proper certificates, and must make good all damages sustained by his neglect or irregularity.

36. The quarter-deck must never be left without one commission officer at least, and the other necessary officers which the captain may deem proper to attend to the duty of the ship.

37. Commanding officers are to discourage seamen from selling their wages, and not to attest letters of attorney, if the same appear to have been granted in consideration of money given for the purchase thereof.

38. On ships of the United States being visited by custom house officers, the captain will offer them every facility in the performance of their duties; and if there should be a suspicion of any person having articles on board, subject to the payment of duties, which such person is desirous of smuggling, he is to give them every possible assistance in discovering such articles, if they are really on board. If he should discover any officer in the act of smuggling, or attempting to smuggle, he is immediately to arrest such officer, and report the matter to the secretary of the navy, in order that such directions may be given as conduct, so injurious to the public and so disgraceful to an officer, shall require.

39. He is not, under pretence of lightness or neatness, or on any other account, to make any alteration in the manner of fitting the standing rigging, on which the safety of the masts so entirely depends; but he is to keep the shrouds and stays as they are fitted in the dock and navy yards; and if he should have occasion to fit others, he is to do it in the same manner; nor is he to suffer any alteration to be made in the established manner of rigging ships; or any experiment to be made, or expedient to be practised, by which the shrouds, stays, or other rigging, may be endangered, or exposed to unnecessary chafing or wearing.

40. He is to favour the masts as much as possible, never hazarding them in carrying too much sail, except in chase, or on other necessary occasions. He is to be attentive in observing that the shrouds and stays are properly set up, especially when new and apt to stretch; but in doing this, he is to be particularly careful in preventing the masts from being so much stayed as to risk their being crippled or sprung.

41. He is to direct the carpenters and caulkers to make such repairs in the ship and boats as the stores on board will permit, that on his arrival in port, as little time and as little assistance from the dock-yard as possible, may be required to refit her.

42. While in port or roadstead, he is to follow the motions of the senior officer present, by striking or getting up the yards and topmasts, loosing or furling sails, and doing any other duties contemporaneously with the ship which the senior officer commands, unless such senior officer shall dispense with his so doing.

43. If a foreign ship shall visit a port of the United States, the senior officer of an United States' vessel of war, (there being no flag officer present,) is to send a lieutenant to the officer commanding her, to inquire his reasons for entering, and to offer him any assistance he may stand in need of; and he, and all other officers of the United States' navy, are to show to the officers of such foreign ship, during their stay in port, such attention and respect as their rank and situation may require; and to afford such assistance to the ship, if wanted, as circumstances will admit, and as a power in amity with the United States may reasonably expect.

44. He is to pay every attention to the comfort of the sick and wounded, causing a comfortable place to be provided for them in any part of the ship, where they will be least incommoded. And he is to direct to be furnished births, cradles, cots, buckets with covers, and every other convenience they may require. And on the appearance of any contagious disease, he is to cause the persons infected to be separated from the rest of the ship's company, and consult with the surgeon as to the best means of preventing the spreading of such contagious disease.

45. He is required to keep copies of all official correspondence.

46. He is to see that on all occasions strict justice is done to the officers and men under his command, that they have their proper allowance of provisions, that no improper charges are made against their wages, and that no cruelties or oppressions are practised. He, alone, is to order punishment to be inflicted, which is never to be done without sufficient cause, nor with greater severity than the offence shall deserve, nor in any case beyond what is authorized by the "Act for the better government of the navy of the United States," passed April 23, 1800. All the officers and ship's company are to be present at the infliction of every punishment, and the captain himself is to attend to see it properly executed. Not more than one dozen lashes shall be given on any account at one punishment; nor shall men be subjected to long confinement, except for trial by court martial, nor be deprived for more than a week at a time of their grog, nor punished by a reduction of their allowance of provisions, nor exposed for punishment to any uncommon hard work or service, to exposures that may endanger their health, or to any kind of torture, for any offence committed. They are, when necessary, to be brought to the gang-way, or, if the offence deserves a severer punishment, they are to be tried by court martial.

47. The captain of a ship carrying a broad pendent, is on all occasions of duty to consult his commander, and a respect due to him, requires that he should not inflict any punishment without his knowledge.

48. When the captain is removed from the command of a ship, he is to be governed by the 29th article of the regulations and instructions for the commanders of fleets and squadrons; and when

removed from one ship to another, (if it can be done without any inconvenience to the service,) he will be allowed to take with him the following number of men, not, however, without express orders to that effect from the secretary of the navy, or his commanding officer.

If removed from a 74 may take 50, of whom may be petty officers 10

do.	44	do.	40,	do.	8
do.	36	do.	32,	do.	6
do.	sloop	do.	20,	do.	4
do.	brig	do.	15,	do.	3
do.	schooner or cutter,		10,	do.	2

Which men are to be in addition to his clerk, coxswain, steward, servant, or cook, whom he may remove without an order. But the men he may take with him are to be replaced from the ship he shall take command of, with an equal number of the same rate and of the same quality, as those whom he may take with him.

49. He is to give to his successor a particular account of the qualities of the ship according to the annexed form, together with such further information on any subject relating to her, as his experience and observation may enable him to give, and as he may deem of service to any captain commanding her. This account is to be signed by himself, the first lieutenant, master, boatswain, and carpenter, and a duplicate thereof is to be sent to the office of the navy commissioners. This account must be given in the following form:

Observations on the qualities of the United States ———, the ——.

1. Her best trim for sailing.
2. Her draft of water, forward and aft, when victualled for six months, and stored for foreign service.
3. The quantity of iron and shingle ballast on board.
4. How she sails, close hauled.
   in a top-gallant gale.
   in a topsail gale.
   under reefed topsails.
   under her courses.
5. How she steers, and how she wears and stays, under her
   top-gallant sails.
   topsails.
   reefed topsails.
   courses.
6. How she lays to in a gale, and under what sail, she behaves best.
7. How she sails and steers with the wind abeam under her
   royals.
   top-gallant sails.
   topsails.
   courses.

8. How she sails with the wind on the quarter, under all sail.
staysails.
royals.
top-gallant sails.
topsails.
courses.
9. How she sails and rolls before the wind, and the effect on her masts, under all sail.
royals.
top-gallant sails.
topsails.
scudding in a gale.
10. How she rides at anchor in a heavy gale and sea.
11. How she stands under her sails.
12. How she stows her provisions and water, and what quantity of the latter she carries, when victualled for four and six months, and the quantity of ballast that may be dispensed with in the room of six months provisions.
13. The number of tons of provisions taken on board, when stored for the above time.
14. General remarks as to her sailing under all circumstances with other ships; showing the proportion she gathers to windward or fore-reaches; her proportion of leeway in general, and any other circumstances worthy of note.

50. If a United States vessel of war should be wrecked, the captain is to use every possible exertion to save the lives of the crew, and to preserve the stores, provision, and furniture of the ship. He is also to endeavour to save the ship's papers, particularly the muster and slop books; and to take special care to preserve or destroy all signals, secret orders, and instructions, to prevent their falling into improper hands. He is to dispose of the crew in a manner most conducive to their comfort and the public interest; and to be very particular in keeping up a regular and perfect discipline among them; carefully preventing the commission of any irregularity which may give offence to the inhabitants of the country they are in.

51. He is to lose no time in getting the crew to the United States; to effect which, he is authorized to dispose of, on the best terms, the property saved from the wreck, or to draw on the secretary of the navy for the necessary moneys.

52. Whenever any commander of a public ship or vessel of the United States shall find himself placed in such circumstances as shall compel him to strike his flag to an enemy, he is to take special care to destroy all his secret instructions, signal books, and private signals; and for this purpose they should be always kept fastened to a weight so heavy as to sink them immediately on being thrown overboard; and on inquiring into the loss of the ship, he will produce evidence of his having done so.

53. The ship, and every person on board, being placed under the command of the captain, he will be held responsible for every thing done on board. From him will be expected an example of respect and obedience to his superiors, of unremitted attention to his duty, and a cheerful alertness in the execution of it, in all situations and under all circumstances. He will be expected to observe himself, and strongly to enforce in others, the most rigid economy in the expenditure of public stores, and to show, by every means in his power, a steady determination to serve his country with the utmost zeal and fidelity; and although particular duties are hereafter assigned, and various instructions given to every officer in the navy, yet the captain will be expected to see that all these instructions are obeyed, and all these duties performed by the officers to whom they are respectively assigned. From him it will be expected, that all those, whether officers or others, shall be corrected, or their conduct properly represented, who are disobedient or disrespectful to their superiors; neglectful of their duty; wasteful of the public stores; or who, by their conduct or conversation, shall endeavour to render any officer or other person dissatisfied with his situation, or with the service on which he is employed. He is to observe with particular attention the conduct of every officer, and of every other person under his command; that, being acquainted with their respective merits, he may assign them such stations as they may be qualified to fill, and for arduous and dangerous enterprises, may select those whose ability and courage may afford the best hopes of success. He is to be extremely attentive to every thing done by his clerk, who, being appointed for the sole purpose of assisting him, will be considered as always acting by his orders. He will, therefore, be held responsible for every thing done by the clerk, and be made accountable for every error he may commit in the discharge of his duty.

CABIN FURNITURE.

1. The commander of a squadron shall be allowed, on fitting out, to equip the cabin of a ship of the line, in lieu of every expense for moveable furniture, the sum of seven hundred and fifty dollars.

2. There shall be allowed, on fitting out, to equip the cabin of a captain, in lieu of every expense for moveable furniture, five hundred dollars.

3. There shall be allowed, on fitting out, to equip the cabin of a master and commander, in lieu of every expense for moveable furniture, four hundred dollars.

4. There shall be allowed, on fitting out, to equip the cabin of a lieutenant, commanding a brig below the rate of a sloop, in lieu of every expense for moveable furniture, two hundred dollars.

5. There shall be allowed, on fitting out, to equip the cabin of an officer commanding a schooner or cutter, mounting twelve guns, in lieu of every expense for moveable furniture, one hundred dollars.

6. There shall be allowed, on fitting out, to equip the cabin of an officer commanding a vessel mounting less than twelve guns, in lieu of every expense for moveable furniture, fifty dollars.

7. The articles of furniture for cabins shall be purchased by the purser of the ship agreeably to such instructions as the commander may give him, the amount of which he is to charge to the commander's account.

8. On the removal of the commander to another ship, he will deliver over to his successor the articles so charged to him, taking his receipt for the same. This is to be certified by the purser, who will also charge the new commander with the amount of the articles so transferred; and the commander by whom the articles shall be delivered, will transmit to the office of the fourth auditor of the treasury, the receipt so taken as aforesaid, together with the purser's certificate; otherwise the amount of the articles furnished, will be charged against his pay on the settlement of his accounts with the treasury department.

9. Should the ship be laid up in ordinary, the receipt of the commandant of the yard, and the certificate of the purser, will be sufficient vouchers to entitle him to receive his pay.

10. Articles unfit for service must be surveyed by an order from the navy commissioners, or, in the event of a ship being on a foreign station, by an order from the commander of the station, on the application of the commander of the ship, and no new articles are to be furnished until the old shall be condemned, which must be certified by the officers holding the survey, and the certificate forwarded to the navy commissioners.

11. Articles of cabin furniture broken or lost at sea, shall be replaced by the commander of the ship at his own expense, unless he shall make it appear by the certificate of two commission officers, that such loss or breakage was occasioned by unavoidable casualties, or accidents beyond his control.

12. No articles of silver plate for the use of the cabin, are to be furnished at the expense of the United States.

DUTIES OF A LIEUTENANT.

1. A lieutenant is to be constantly attentive to his duty, and diligently and punctually to execute all orders for the service which

he may receive from the captain or any senior officer. When he has the watch, he is to be constantly on deck until relieved by the officer who is to succeed him. He is to see that the men are alert and attentive to their duty, that every precaution is taken to prevent accidents from squalls of sudden gusts of wind, and that the ship is as perfectly prepared for battle as circumstances will admit. He is to be particularly careful that the ship be properly steered, and that a correct account be kept of her way, by the log being duly hove, and the leeway for each hour marked on the log-board.

2. He is to see that the master's mates and midshipmen of the watch are constantly upon deck and attentive to their duty. And he is to order the men of the watch to be frequently mustered, and to report to the captain such as he shall find absent from their duty.

3. He is to be extremely attentive to keep the ship in her station, in any squadron he may belong to; and he is to inform the captain whenever he apprehends that he shall not be able to do so.

4. He is to inform the captain of all strange sails that are seen, all signals that are made, all changes of sail made by the commander, all shiftings of the wind, and in general of all circumstances which may derange the order in which the fleet is sailing, or prevent the ship from continuing on the course directed to be steered.

5. He is to be very particular in delivering to the lieutenant who relieves him on the watch, all orders received by him from the captain or the lieutenant he relieved, remaining unexecuted, and he is to inform him of all signals made by the commander in chief, which still remain to be obeyed. He is to point out to him, more especially in the night, the situation of the commander in chief, and to inform him what sail his ship was carrying, when it could last be ascertained, and whether the ship was coming up with, or dropping astern of him, and he is to give, in general, whatever other information may be necessary to enable him to keep the ship in her station, if the fleet be formed in the order of sailing, or to keep well up with it if it be not so formed.

6. He is to keep men at the mast heads during the day, and in proper stations during the night to look out. He is frequently to remind them of their duty, if necessary, and to relieve them more or less frequently, according to the state of the weather, and the degree of their attention.

7. On a strange sail being seen in the night, during war, he is to send a midshipman to inform the captain, and is himself to make arrangements for getting the ship ready for action. He is to keep out of gun-shot until every thing is ready, but in doing this he is not to remove to such a distance as to risk losing sight of her.

8. He is never to carry so much sail as to endanger the springing of any mast or yard, unless some particular service should require it; and when he does so, he must take care that all the men

in the watch are at their stations, ready to shorten sail the moment any increase of wind or other circumstances shall make it necessary.

9. In the night he is to take care that the master at arms and corporals, in their respective watches, are very particular in going the rounds, and that they visit all parts of the ship every half hour, to see that there is no disturbance among the men, and that no candles or lamps are burning, except such as are expressly allowed.

10. He is to direct the carpenter to sound the well himself, or direct one of his mates to do it, twice at least in every watch, and to see that the ports are well barred; and the gunner, or one of his mates, to examine, once at least in each watch, the state of the lashing of the guns, and to report to him when they have done so.

11. In the morning he is to direct the boatswain to examine the state of the rigging, and the carpenter that of the masts and yards. He is to receive their reports and to inform the captain of any defects they may discover.

12. He is never to change the course of the ship without directions from the captain, unless it be necessary to avoid some danger.

13. If the ship belongs to, or is in company with, any fleet or squadron, he is to direct some careful officer to observe the signals made by the commanding officer; but he is never to answer any signal, whether general or addressed particularly to the ship to which he belongs, until he is certain that he sees it distinctly, and understands for what purpose it is made; and he is every evening, before dark, to see that lanterns with candles, and every thing necessary for making signals in the night are ready and in good order, and that the number of guns which may be directed, not shotted, are ready for being fired, and to be particularly attentive in preventing any other lights being shown in the ship when signal lights are hoisted, and when at sea, that no lights may be seen from the cabins or any part of the ship.

14. During a fog he is to be particularly attentive to the guns fired by the commander in chief, that, by observing any alteration that may take place either in the direction or strength of the report, he may take such steps as may be deemed necessary to prevent the ship's being separated from the fleet. He is to be very careful to order the drum to be beat and the bell to be sounded according to the tack the ship may be on, for the information of ships that may be near.

15. He is to see that every occurrence worthy of notice, during the watch, be properly entered on the log-board, and that all signals made in the fleet are correctly minuted in such a manner as the captain shall direct; and at the end of his watch, he is to sign the log-board and the report of signals with the initials of his name; and in like manner when the occurrences of the day and the report of the signals have been entered in the log-book, he is to sign that with his name at the end of each watch he kept.

16. He is constantly to ascertain the latitude by observation at noon or by double altitudes, as circumstances may require, and to

keep an account of the ship's way; specifying the course steered and the distance run for each twenty-four hours, with latitude and longitude she is in, and the bearings and distance of some head land from which she sailed, or towards which she may be going, with other particulars, and in any form that the captain shall direct, which account he is to deliver to the captain every day as soon after noon as the other duties of the ship will allow.

17. He is not to make any signals by day or night, except such as may be necessary to warn ships of any danger to which they might be exposed, without the directions of the captain.

18. In time of action he is to see that all the men under his command are at their quarters, and that they do their duty with spirit and alacrity. He is to be particularly attentive to prevent them from loading the guns improperly, from firing them before they are well pointed, and from wetting them after they have been fired, and he is to be very careful to prevent their making an improper accumulation of powder in any part of his quarters.

19. He is to be attentive to the conduct of all the ship's company, to prevent all profane swearing and abusive language, all disturbance, noise, and confusion, to enforce a strict obedience to orders, a proper respect to all superiors, and an observance of discipline and good order. And he is to report to the captain all those whose misconduct he shall think deserving of reprehension or punishment.

20. No boat is to be allowed to come alongside, or to go from the ship, without direction from the lieutenant of the watch. When vessels or boats come alongside with provisions, stores, water, &c. he is to see that they are cleared without delay, and that the articles are taken into the ship with the utmost care, to prevent their suffering any damage, and when any provisions, stores, empty casks, &c. are to be sent from the ship, he is to be equally attentive in causing them to be put into the vessels or boats appointed to receive them.

21. When a lieutenant is called by signal on board of a commodore's ship, he is to carry with him an order-book, in which he is to enter any orders that may require it, whether given him verbally or in writing.

22. In the absence of the captain, the senior lieutenant on board the ship is to be responsible for every thing done on board. He is to see every part of the duty as punctually performed as if the captain were present. He may put under arrest any officer whose conduct he shall think so reprehensible as to require it, and he may confine such men as he may think deserving of punishment, but neither he, nor any other lieutenant who may become commanding officer, is to release an officer from his arrest, nor to release or punish any man who has been confined, for this is to be done by the captain only, unless he be absent from the ship with leave from the secretary of the navy, or from his commanding officer, in which

case it is to be done only by the senior lieutenant commanding the ship in the captain's absence.

The publisher of this work begs leave to add a few remarks relative to the all-important duties of lieutenants, on which, in a great measure, depends the discipline of the crew. The time of a commanding officer is often so occupied that he cannot make himself personally acquainted with the disposition of the ship's company, and of course they come more immediately under the notice of the

LIEUTENANTS,

The first of which is the executive officer of the ship under the captain, and all duty, both military and civil, is under his direction. He is to pay strict attention to see that the vessel is properly fitted for sea, and he has the charge of all her stores and armament. All quarrels and dissentions among the ship's company are to be justly decided by him.

The ship's company, if possible, to be at three watches, and to be divided into as many divisions of equal parts of the different stations as there are lieutenants belonging to the ship, with a proportion of mates and midshipmen. Complete water stations and quarter bills are always to be hung by the articles of war, under the half-deck, and every man is to be made perfect in his station. In harbour, when the officer of the watch inspects the cleaning of the decks, it is not intended to preclude the first lieutenant from interfering, if he thinks proper, but only as an assistance from the other fatigues of the station. The newly raised men, who are not acquainted with the exercise of the great guns, small arms, and sails, are to be divided into divisions, according to the instructions contained in the 6th article of General Orders, page 275. In action, he is, under the captain, to fight the ship, and should, by a good example, encourage the men to fight bravely. He commands the first division, or boarders, and in boarding he is always to lead in person; and, should he survive the contest, his humanity will teach him, when he has possession, to check all cruelty, and stop any further effusion of blood; and should the prize throw any females into their power, his authority ought to prevent any licentious madness in the crew, but his honour ought to induce him to treat the unfortunate captives with that delicacy and attention which the fair sex always meet with from a truly brave man.

He is to see all prisoners sufficiently guarded and well attended.

He is to see that the ship's company have their just and full allowance of provisions, and always to investigate into any complaints or murmurings of the ship's company, and, as far as is in his power, he is to rectify such discontent.

When the hands are turned up, he or the captain, are always to command in person. He is to pay a strict attention to the subordi-

nation of the inferior officers and ship's company, and implicitly to obey all orders which he may receive from his captain.

Particular attention is to be paid to the order respecting boats.

We cannot close the important duties of a first lieutenant without remarking that the whole discipline of a ship, in a great measure, depends on his ability and good conduct; with this idea he should, therefore, be prepared to meet and discharge the duty of the station, so that it may reflect honour on his own character and credit to the ship. To acquire this desirable end, it will be found most essential to his purpose to render the officers subordinate to him, pleased and satisfied with his conduct; for, when this is the case, the duty of the ship goes on with spirit, emulation is displayed in every part, each person exerts himself in his separate department, and the whole result of their activity becomes the suffrage to his system and arrangement. The deportment of an officer of this class generally stamps his good or bad name.

He who is polite in giving his orders, and constantly attentive to the ease and comfort of others, will have many little defects in his character as an officer overlooked, whilst a man inattentive to those points will be the subject of every person's scrutiny and examination, and liable to the most unjust and illiberal imputations. As he associates occasionally, not only with his brother officers, but with the heads of the several departments, his conversation should be enlarged and so directed, as, if possible, never to suffer a circumstance which has happened in the duty of the ship to be spoken of at the mess-table. Should conversation accidentally have a tendency to produce that effect, he should retire to his cabin, and he should, upon all occasions, consider the quarter-deck as the parade, where all orders ought to be delivered.

By these means many disagreeable altercations will be avoided which would probably occur, were an officer to disclose his intentions in private. Whenever disputes arise, he should be the peaceful mediator; his interposition will carry authority with it from his situation; and, when exercised with propriety, will insure him the respect of his contemporaries. He should strive by his own example to rectify or form that of others; for if an officer once forgets his consequence, by any improper behaviour, he opens a door to the contempt and derision of every subordinate, deprives himself of the principal spring of authority, and thus subjects himself to the mercy of every officer on board, by being obliged to request by solicitations such an attention and obedience to orders as might otherwise be commanded with a consciousness of that proud feeling that an officer, confident in his own integrity, has in commanding the same. When all hands are upon deck, he should never fail to attend, as his presence will always enforce a more speedy compliance and general attention to the duty which is performing; it will likewise enable him to ascertain and judge of the abilities and disposition of the people. This conduct should be marked by its system and regularity. never

engaging in familiarities, or disgusting his associates by a proud reserve. And if, contrary to every sense of feeling and propriety, a subordinate officer should happen to be insensible to this mode of behaviour, and attempt to thwart or disobey his superior in the execution of his duty, he ought most scrupulously to assert and maintain the consequence and authority vested in his station. As he is the executive officer who regulates the ship's company, he should endeavour to ascertain each man's ability, to acquire the number of effective men, and then dispose of them accordingly. As, for example, the heavy work falls principally on the afterguard and waisters, who are generally composed of ordinary seamen and landsmen, of whom there are a greater number than of seamen, consequently the largest portion of duty must attach to persons in those situations, including a few good seamen to lead and instruct the rest. The boatswains' mates ought to be very select men, as the leaders of a ship's company ; they should be very perfect seamen ; and as having an irksome, unpopular part to perform, they ought to be circumspect and determined in their conduct.

The necessary qualities requisite to form a good boatswain's mate makes them very rare ; the situation must be countenanced and supported, as no man otherwise would feel spirit sufficient to enforce the orders he delivers, and obedience to his commands. The quarter-masters and gunners are generally men of prime abilities ; the former are more in the line of officers than the latter, but both situations comprehend the nicest and most skilful parts of seamanship, and should be considered as the line of encouragement to good men and reserve for good seamen. The duty is not so laborious as in other situations, which makes it frequently the retreat for old seamen ; a circumstance which, although arising from humane principles, destroys the vigour of the station. As a choice situation, it ought to be filled by deserving men ; and the man who has been the longest time in the service, and bears a good character, has undoubtedly a prior claim to fill up any vacancies that may happen, in preference to a person of superior ability who has but recently entered the service, as it will operate both as a compensation to the men who have entered early into the navy, and as an inducement to others to do the same. A desire to soften the feelings of old age, and to afford comfort and relief to the man that has devoted his best days to the profession, is very natural, but the necessity of having a reserve of vigour and ability in those situations will show the impossibility of devoting them to that purpose, without sacrificing the interest of the service. Wounded seamen, who have conducted themselves with propriety, will have an asylum, which, by a proper representation of their merits from their captain, insures them in the decline of life, repose from their fatigues, together with all the comfort and happiness resulting from the society of their former associates. Here the wise economy of a munificent and well-regulated establishment

not only affords them a competent subsistence, but provides them likewise with a periodical* allowance to furnish what may be considered as the luxuries of life. The gunner's crew in a ship appears to be a class much neglected; for, instead of making them skilful artillerymen, and retaining them principally for that service, they are too often suffered to remain totally ignorant of it and only perform that part of the duty of seamen which is attached to their station. As gunners, it was certainly intended, from the name they bear, that they should be acquainted with some part of the art of gunnery: and if this was the case they ought first to be well acquainted with it themselves, that it may become their duty to instruct the raw hands in the knowledge of it afterwards. The forecastle men are generally chosen from their abilities as seamen, and from some peculiar distinctions attached to the station, feel a pride in their department: after the three first stations this follows; in small ships, they are usually all seamen, but in large ones, where a great number is required, and real seamen are scarce, the complement is made up by ordinary seamen. Top men are mostly composed of young active men, who have been at sea three or four years, and understand the rudiments of seamanship; they have the large share of duty to perform, and are the most useful class of people on board. As young seamen, whom an officer is to regard as the rising part of his crew, he should use every endeavour to induce them to feel a pride and emulation in acquiring the necessary qualifications of seamanship, in order to fill a superior situation; and nothing will ease the trouble of the executive officer more in this respect, or conduce to form this spirit sooner, than placing a good leader over them. The captain of the top should be an enterprising, active man, who shows a pride in excelling his fellows in promptitude and good appearance, and who would encourage the men under him to exert themselves in their duty. The afterguard and waisters are generally composed of indifferent seamen and landsmen, and are the largest part of the crew, on whom the whole drudgery of the ship devolves. These men have not anly the burthen, but every dirty and inferior duty to execute; to them I conceive an officer's principal attention should be directed, and every encouragement and inducement made use of to reconcile them to the service, and to acquire a knowledge of seamanship. Rewards and punishments are ever the most certain mode of succeeding where the object requires a stimulus to animation, and a check against sloth and laziness. This observation points out the necessity of having recourse to superior ratings where an individual distinguishes himself by his attention or quickness in learning his duty, and of punishing him if he is negligent or inattentive, with inferior rating, and degrading duty. Great pains ought to be taken in order to teach young seamen the names of the ropes and their different uses; how to knot and splice, reef and

* Two and a half per cent is paid for this purpose on all captures.

furl a sail, steer a ship, heave the lead, and row in boats, together with the exercise of the great guns and small arms. By commencing this system of instruction with the landsmen, it will stimulate the seaman to improve himself in those respects wherein he is not perfect, and will keep in his remembrance that which he is acquainted with. I conceive every man, before he is rated from a landsman to an ordinary seaman, should be examined by the first lieutenant, master, and boatswain, and should be required to know the following points, viz. all the names of the ropes, the exercise of the great guns and small arms, to be able to row, make sinnet and knot yarns, and again, before he is rated an able seaman, that he shall be able to steer, heave the lead, knot, splice, secure a gun, make points, robands and gaskets, set studding-sails, make up sails, serve rigging, strop blocks, turn in a dead eye, and clap on a seizing; the latter, as a new thing, may be laughed at, but let any man consider how landsmen are to be made seamen but by instruction, and how is instruction to be communicated but by a systematic plan, and forwarded by means of rewards and punishments.

When every profession feels the necessity of education and practice, why should it be neglected in the navy? A ship that is well-manned, and which receives a certain proportion of landsmen, the officers too often look on them as an incumbrance, and instead of pursuing the measures which are intended for their instruction, appropriate that service for them to perform which stifles emulation, and keeps them in that state of ignorance which nothing but their natural disposition will ever verge them out of.

The boys in a ship might be made of much greater use than they generally are, and a foundation laid for their future improvement. The present custom is to suffer the officers to take such as they think proper to attend on them, and those who have no masters are permitted to go at large, or perhaps admitted into the mess of a boatswain's mate, or quarter-master, on condition that they perform all the menial offices of the birth; in lieu of this we would recommend the surplus part, after the officers areprovided with servants, to be attached proportionably to the different stations, under the immediate charge and authority of the captains of the tops, forecastle, and sail-maker, who should have some recompense for instructing them. The want of some fixed plan for carrying these systems into execution, appears to be the greatest bar to their adoption. The difficulty of reducing men's minds to bear, with satisfaction, the confinement of a ship, their having few objects to attract attention, the compactness of their society, the secrecy of their opinions, and their particular attachments to each other, are circumstances which render the discipline of a ship less attainable than that of a regiment. For these reasons an officer who commands seamen should make himself acquainted with their dispositions and characters, in preference to any other consideration.

By this he will be enabled to improve every favourable oppor-

tunity of rendering discipline subservient to his command; and if he adds a liberal confidence and good encouragement to the marines, he will find that he has taken the surest methods of establishing good order and regularity on board. In having dwelt on the two situations of captain and first lieutenant, we have supposed the latter to be intrusted with that power which constitutes an executive officer, and having treated on his situation from that idea, as, without such a position, we could not have described what we consider as essential to the relative distinctions between a captain and his first lieutenant, however such distinctions may vary according to the character and abilities of these officers respectively.

We shall now proceed, in a progressive manner, from a ship's being first commissioned, to the various stages she is liable to be placed in, and point out the most approved method of acting in each so as to constitute and preserve discipline. In speaking of the executive officer we always mean the first lieutenant, who, when receiving the sanction and support of his captain, may justly be considered such. The other officers in a ship, who act a subordinate part, and have no lead in the duty, cannot adopt a safer line of conduct for their comfort and respectability, than that obedience to the general orders of the service, and those which are given for the internal government of the ship, with the most precise regularity; to follow the method adopted by the executive officer, of carrying on duty in the different watches; and when either is left commanding officer, to attend strictly to his system and arrangements, even if any misunderstanding should exist, and not attempt to raise a momentary fame by relaxing from his rigour, who requires, for the general advantage of the service, the assistance and co-operation of every officer on board.

SECOND LIEUTENANT.

He is second in rank, next to the first lieutenant, and in his absence succeeds to his functions. He has, should the first lieutenant keep no watch, charge of the first watch.

He is frequently to cause the watch to be mustered, and see that they are on deck, and to report all absentees, to be reported through the first lieutenant to the captain, in the morning. He has frequently to hail the look-outs, to keep them alert, and to see that they are regularly relieved.

He is not to make or shorten sail, except in case of immediate necessity, without acquainting the captain of it; as also of all strange sails or other material circumstances.

When the first lieutenant takes charge of the quarter-deck, his station is on the forecastle, as also when the hands are turned up, to work ship.

In action he commands the first division, or foremost guns, and the second division, or firemen. He is to show a good example and obey all orders of his superior officers.

THIRD LIEUTENANT.

He takes charge of the second or third watch; his duty, on all hands working ship, is in the waist. In the night he is to muster the watch as before.

In action he commands the second division, or aftermost guns, and the third division, or sail-trimmers; he is under all orders of his superior officers.

DUTIES OF THE MASTER.

1. A master, when attached to a ship, is to be constantly attentive to his duty, and diligently and punctually to execute all orders he may receive from the captain, or any of the lieutenants of the ship, for the public service.

2. If the ship be newly commissioned, he is to obtain the most correct information he can of the manner in which her hold was stowed when last in commission, and what were then her qualities, that her stowage may be altered if there be reason to suppose it may be done with advantage. If the ship shall not have been at sea, the master is to consult the master shipwright, on what may be the best manner of stowing her. But if he find the hold already stowed, he is to inform himself how it has been done, and he is attentively to examine her qualities at sea, that he may suggest such alterations in her stowage as he may think likely to improve them.

3. He is to be present himself at the stowing of the hold, to see that the ship has the proper quantity of iron and shingle ballast, and he is to stow her in a manner best qualified to preserve her trim, to make room in the hold, and to admit of the stowage of the water and provisions without risk of damage to the casks. He is to stow away as much wood in the hold as possible; and if it should appear to him that the quantity of wood and coals will not be sufficient for the time for which the ship is victualled, he is to report it to the captain.

4. He is to be present when stores or provisions are received on board, to see them carefully and expeditiously hoisted in to prevent their being damaged; and if any of them should appear to him to be in any respect defective, he is to report it to the captain or the commanding officer on board, that they may be surveyed as soon as the service will admit, and then disposed of in conformity to the report of survey.

5. If any provisions are pointed out to him as being older than the rest, he is to stow them in such a way as to admit of their being first hoisted up; and on receiving any subsequent supplies, he is, whenever circumstances will admit, to put the new provisions under the old, that they may be the last expended.

6. When the stowage of the hold shall be completed, he is to enter into the log-book a particular account of the manner in

which it was done, specifying the quantity of iron and shingle ballast in each hold, with a draft of the same, and the manner in which they are arranged, with the size and number of the casks in each tier, and showing the manner in which they are disposed of.

7. He is to be particularly careful in observing that the cables are securely clinched ; that they are properly spliced and coiled in the tiers ; that the rounding is well put on, and carried far enough to secure the cable from being chafed when across the cutwater.

8. He is to keep the keys of the after hold and spirit room, which, when wanted, he is to deliver to one of the master's mates only, strictly charging him not to suffer light to be carried into the spirit room ; to attend himself, without quitting on any account, the spirit room or after hold, while open ; to see it properly secured when the service for which it was opened shall be executed, and to return the keys to him as soon as he has done so.

9. He is to see that the sails are properly fitted with points, robands, earings, &c. ready for being brought to the yards ; and that the boatswain has always a sufficient number of spare points, robands, gaskets, mats, plats, knippers, &c. ready for any purpose for which they may be wanted.

10. He is to be attentive in observing the quantity of every species of provisions hoisted up from the hold, that, if the quantity should appear to be more than is necessary for the ship's company, he may inform the captain. He is to attend also to the quantity of wood and coals hoisted up, that he may prevent any improper expenditure of them.

11. He is to be particularly careful to prevent any waste or improper expense of water, and never to allow of its being started or pumped out in the hold without particular directions from the captain—nor is he to suffer more to be hoisted up in a day than the quantity allowed.

12. He is every day to report to the captain the quantity of water expended during the last twenty-four hours, and the quantity remaining on board.

13. He is, with the first lieutenant, to visit the store rooms of the warrant officers, to see that they are kept as clean and as well ventilated as circumstances will admit ; that no other than the stores of the ship are to be put into them, and that the stores are arranged with such regularity as to admit of any of them being found when wanted.

14. He is frequently to visit the cable tiers, to see that they are kept clean, and that no injury is done to the cables ; and he is to direct the master's mate to be very careful to prevent any accumulation of dirt in the hold, and to take every opportunity of collecting and throwing overboard any filth that may be found there.

15. He is frequently to inspect the sail-rooms, to see that they are dry, and the rooms in good order. He is to give orders for their repairing sails immediately on discovering that they require it; and if he should find them, or any of the stores, at any time likely to be damaged by dampness, or by any other cause, he is immediately to represent it to the captain.

16. He is to be extremely attentive in preventing any unnecessary expense of casks, or any damage being done to them by improper violence in stowing them, or getting them into, or out of, the ship. He is never to allow them to be shaken, without an express order in writing from the captain for that purpose.

17. Whenever it shall be necessary to break up or clear the hold and to start the water, he is to see that the bungs are carefully taken out of the casks, and the water started upon deck from the bung-holes; and that the empty casks are carefully lowered into the vessels appointed to receive them: as the expense attending the repairs of, or any considerable damage done to, the casks, by breaking in the heads or staves, or by throwing them over the gunwales, &c. will be charged against his pay.

18. When there is a probability of the ship's being anchored, he is to see that the anchors and cables are perfectly clear for running; that the stoppers and ring-ropes are in good order; and that every thing is ready for bringing her up properly, especially when she is to anchor in high winds and in strong currents.

19. When the ship is at single anchor, he is to keep the anchor clear, and prevent the cables from being chafed; and when she is moored, he is to keep the hawse clear; and should it at any time become foul beyond a cross, he is to represent the same to the captain or commanding officer, that it may be immediately cleared. He is to see that the rounding is in good order, and that the ship is not girt by being moored too tight.

20. He is frequently to examine into the state of the rigging; to see that the standing rigging is always kept well set up; to attend himself when it is set up; to examine frequently the running rigging, and to inform the captain when any part of it appears to be no longer serviceable.

21. At the end of every week, he is to examine the boatswain's and the carpenter's accounts of stores expended, and at the end of every month he is, with the first lieutenant, to sign their expense-books, which he is to examine with very great attention before he signs them, to prevent the insertion of expenditures which have not been made, or an improper account of those which have.

22. He is to see that the compasses, the hour and other glasses, are properly taken care of; to try them, and compare them with each other frequently; to ascertain and prevent the bad effects of any error which may be in them; to see the log-lines and lead-lines correctly marked, and at hand whenever they may be wanted.

22. The charts, nautical books, and instruments belonging to the ship, are to be delivered to, and charged to the account of, the master: and on his removal, he is to deliver them over to his successor, or the storekeeper of a yard, taking his receipt for the same; which receipt, when approved by the captain, is to relieve him from all further responsibility respecting them.

24. He is, under the command of the captain, to have the charge of navigating the ship. He is to represent to the captain every possible danger in or near the ship's course, and the way to avoid it; and if it be immediate, to the lieutenant of the watch. Whenever the ship shall be approaching the land or any shoals, he is to be upon deck and keep a good look out, always sounding to inform himself of the situation of the ship.

25. He is every day, at noon, to deliver to the captain an account of the situation of the ship, the latitude and longitude she is in, the variation of the compass, the bearing and distance of the place sailed from, or of that to which the ship is bound, and every other particular which the captain shall direct.

26. He is to see that a sufficient number of master's mates and midshipmen attend every day to observe the meridian altitude of the sun, or to take double altitudes, if the obtaining of a meridian one be doubtful; and he is to direct such as he shall think proper to assist him in making any other observations or calculations which he may think necessary.

27. When the ship shall be in pilot water, although there may be a pilot on board to take charge of her, the master is to be always attentive to the manner in which she is conducted, he is to see the lead carefully hove, &c. if the pilot should not require it; and is to have every thing prepared for anchoring at the shortest notice, and if he perceives the ship standing towards danger, or if he has reason to think the pilot not properly qualified to conduct her, he is immediately to inform the captain.

28. He is to endeavour to ascertain, with every possible degree of accuracy, the latitude and longitude, and the variation of the compass, at every place he visits, and of every remarkable head land which he passes. He is also to ascertain the setting and velocity of the currents, the time of high water at the full and change of the moon, the direction of the tides, with the extent of their rise and fall. He is to observe and describe, as particularly as he can the appearances of coasts, pointing out remarkable objects by which one part may be distinguished from another. He is to apply to the captain, whenever he may think the service will admit of it, for boats to survey any coasts or harbours which may be near; and he is to enter all the observations he may make, and all the information he may obtain, in a book, according to a prescribed form, the columns of which he is to fill up with all possible correctness. He is frequently to deliver this book to the captain for examination; and, at the end of every six calendar months, he is to deliver to him a correct copy, containing all the observations

made, and information obtained, during the last six months, accompanied by the charts of all surveys taken, and the views which have been drawn of the coasts within that period: which book the captain is to transmit, by the first safe opportunity, to the secretary of the navy, and at the end of the voyage, or before he leaves the ship, at any time, he is to deliver to the captain, to be by him transmitted to the navy commissioners, a copy of such book, containing the observations, &c. and a set of charts, containing the surveys, views, &c. during the whole time he may have been master of the ship.

29. He is carefully to examine the charts of every coast on which the ship may be employed; and at the end of the book of observations he is to insert a list of the charts by him examined, specifying by whom, and at what time they were published, with such opinion as he may have been enabled to form of their correctness or inaccuracy; distinctly pointing out every error he may discover, and which was either not known or imperfectly known before, carefully describing its bearings and distances from some remarkable point or points, with its size, the depth of the water on it at different times of tides, the soundings near it, and any other circumstances relating to it which may be worthy of notice—all which he is to insert in the ship's log-books, at the time the discoveries and observations shall be made.

30. He is to have the charge of the ship's log-book, which is to be written by the master's mates, under his immediate inspection. He is to compare it every day with the log-board, to see that every circumstance which has occurred is properly entered in it; and he is to send it immediately to the lieutenants, that they may sign their names at the end of their respective watches, while that which happened in them is still fresh in their memories. In the log-book he is to enter, with very minute exactness, each of the following circumstances, viz.:—

1. The state of the weather, the directions of the wind, the courses steered, and the distances run, with every occurrence relating to the navigating of the ship, the setting and velocity of currents, and the result of all astronomical observations made to ascertain the situation of the ship, the variations of the compass, &c.
2. The loss of yards, masts, boats, &c. the splitting of sails, the blowing away of flags or colors, and all other accidents, with the quantity of each article lost and saved.
3. Every circumstance relating to the supply, receipt, loss, survey, and returns of slop-clothes, provisions, casks, and water, specifying from whom they were received, and to whom they were supplied or returned, and by whose order, if any order was given, with the number of casks and packages, written in words at length.
4. An account of the quantity of every species of stores purchased for the ship, or received from, or supplied to, any other

United States' ships, or to merchant ships, or to any foreign ship or arsenal.

5. Every alteration made in the allowance of provisions, specifying by whose order such allowance was made.
6. The marks and numbers of every cask of provisions or bale of slops opened for the use of the ship's company, with the quantity it is said to have contained, and the difference, if any.
7. The time when any hired vessel is employed and the time she is discharged, the name of the vessel, of the master, and of the person from whom she was hired, her burden in tons, and the number of men employed in her; by whose order, and for what purpose she was hired, and the cause which makes it necessary to hire her rather than employ the boats of the ship or squadron.
8. An account of the number of any men employed on board, who are to be paid for the service they perform, whether hired for that service or lent from other ships, mentioning the day on which they began and on which they ceased working, and the number mustered every day. Every entry of the receipt, expenditure, loss, &c. of stores or provisions, is to be carefully examined by the officer who has the charge of them, who is to signify that the account is correct, by signing his name at the bottom of it. After the log-book has been signed by the lieutenant, no alteration, however trifling, is to be made in it without the approbation of the captain, and the perfect recollection of the lieutenant of the watch that such alteration is proper.

31. At the end of every six calendar months he is to deliver a copy of the log-book for those six months, signed by himself, to the captain, to be transmitted, by the first safe opportunity, to the secretary of the navy, and at the end of every twelve months, he is to deliver the original log-book, signed by himself, to the captain, to be kept by him until the ship is paid off, and then to be sent to the secretary of the navy. If the master be superseded, he is to sign the original log-book, then in his possession, and to deliver it to his successor, who is to give him a receipt for it.

32. Whenever he shall be ordered to survey stores or provisions reported to be decayed or unserviceable, he is to examine the state of each article with the most scrupulous attention, never trusting to any representation or opinion of others, but making his report so conscientiously, that when called upon to confirm it upon oath, which may frequently happen, he may be perfectly ready to do so. He is, as far as his judgment may enable him to determine, to point out the cause to which the defective state of such stores or provisions are to be attributed, particularly mentioning every appearance of neglect or inattention in those who had the charge of them. If he finds any articles no longer fit for the service for which they were intended, he is to mention, in his report, any other service for which he may think them fit.

33. Whenever he shall be ordered to survey the stores remaining in a ship, whether they are to remain in the charge of the same officer or to be transferred to another, he is to examine them with such attention as to be able, when required, to make oath of the truth of his report, as well to their quality as to their quantity, never allowing any articles to be inserted in the report without being satisfied that it is on board the ship.

34. He is to examine with particular attention all muster-books, tickets, vouchers for stores, and all other papers and accounts before he signs them, as he will be made responsible, not only for such as he shall be found to have signed, knowing them to be false, but also for all mistakes in such books, accounts, &c. by which, through his neglecting to correct them, the public shall suffer any loss.

35. He is to inform the captain whenever it is probable that rope of any description may be wanted in the ship, and when the boatswain or ropemakers are ordered to make it, he is to attend frequently to see that they are diligent, that the rope is well made, and that there is no waste of yarns, he is to receive from them every day an account of the rope they have made, which is to be entered in the log-book, and he is to see that the boatswain charges himself properly with the whole of the quantity made.

REGULATIONS RELATIVE TO NAVAL SURGEONS, AND THEIR ASSISTANTS.

1. Every naval surgeon, on being ordered to a vessel of war in the service of the United States, shall, without delay, report himself to the commanding officer, and take in his charge all the medicines, instruments, hospital stores, utensils, and all other articles ordered for the use of the sick, agreeably to the estimate A; for which he shall give duplicate receipts to the medical purveyor by whom they were supplied. He shall personally examine the articles before he passes his receipts, as he will be held strictly accountable for the expenditure thereof.

2. He shall keep, or cause to be kept, a regular account of the receipt and expenditure of the said articles of medicine, according to the form B, and of the hospital stores as per form C; and at the expiration of every month the amount of the respective columns of hospital stores shall be carried to the credit side of a book as per form D. These books he is carefully to preserve, and at the end of every year to deliver them to the medical purveyor of the depot where he may have arrived.

3. He shall, at the expiration of every cruise, report the quantities of medicine and all other articles received, expended, and remaining on hand, to the medical purveyor of the depot where he may have arrived; which return shall be certified as just and true, and that the articles expended were, to the best of

his knowledge and belief, used solely for the sick and invalids on board the ship to which he is attached, as per form B. He shall, if the ship is to be laid up, deposit all the articles remaining in his possession with the medical purveyor; and in case there should be no medical purveyor, to the surgeon of the yard or hospital where the ship is laid up, and give a written account of all losses; if returned in bad order, the cause or causes thereof. The purveyor, on receiving the balances of medicines, hospital stores, instruments, and utensils, shall give a receipt for the same; and also a certificate of the condition of the instruments, specifying all losses; or if returned in bad order, in consequence of neglect—which certificates shall be forwarded to the Fourth Auditor of the Treasury, with the amount of the losses and repairs required, that the same may be charged to the naval surgeon. All losses which cannot reasonably be accounted for, shall be deducted from the pay of the surgeon and his assistants.

4. When a surgeon is ordered to be transferred, he shall apply to the commanding officer of the ship, and request that two or more surgeons, or other commission officers, may be ordered to superintend the survey of all articles in his possession, in the presence of his successor, noting the quantity and quality of each article; which, when signed by the surveying officers, shall be receipted for by the surgeon who succeeds him, a duplicate of which shall be forwarded, without delay, to the medical purveyor, in order that the complement of all articles may be provided, should the vessel be destined on a long cruise. It is, however, distinctly to be understood, that the first supply shall be considered sufficient for one year, unless there shall have been an unusual prevalence of disease among the crew. This circumstance, moreover, shall be certified, and the certificate forwarded to the medical purveyor, as a voucher for deviating from the established rules of the service.

5. Should a fresh supply of medicines, or other articles in the surgeon's department, be required on a foreign station, in consequence of any extraordinary number of sick, or by any injury sustained in a gale of wind, or in an action, he shall make out a requisition for such articles as he may think absolutely necessary for the remainder of the cruise, or until he shall arrive in the United States; which requisition, when signed by the commander, shall be forwarded to the navy agent or consul of the port where the vessel may be, who will direct the supply thereof. The surgeon shall examine and approve the account of all articles thus supplied, before they are received on board.

6. No condemnation of any articles of medicine or hospital stores shall take place, unless a survey shall have been had on the same, by order of the commander, at the request of the surgeon. A lieutenant, one surgeon and mate, shall be appointed for this duty; and their certificate shall be necessary to exonerate

the naval surgeon from the responsibility which these regulations impose on him.

7. He shall prescribe, for *casual cases*, on the gun deck, every morning at 9 o'clock, due notice having been previously given by his lob-lolly boy, by the ringing of a bell. He shall *visit* those who are confined to the sick births twice a day, or oftener, if necessary, and prescribe such medicines and diet as he may think proper. He shall likewise direct the stoppage of the rations of every man on the sick list, and excused from duty, when he shall issue hospital stores in lieu thereof. The amount of the rations stopped shall be accounted for by the purser of the ship at the end of every cruise, and be paid to the naval hospital and asylum fund.

8. He shall cause the patients under his care to be removed to the sick birth, whenever he shall judge it expedient. He is to request the commander to order as many men as may be requisite to attend their companions day and night, as nurses ; and whilst engaged in this duty, they shall be subject to the orders of the surgeon, unless when mustered or called to quarters. Should they neglect to perform the duties required, and not use tenderness and humanity in the performance of them, the surgeon shall make a proper representation thereof to the captain. The sick birth shall be supplied with a sufficient number of buckets with covers, for the use of the sick, which shall be emptied frequently, and cleansed, and charcoal and water put in them. The birth shall be whitewashed with lime whenever an opportunity offers, and the decks sprinkled with vinegar.

9. He shall be extremely attentive to the personal cleanliness of the patients under his care, and see that the beds and bedding are properly attended to ; also, that the sick are supplied with such medicines, drinks, and nourishments, as their situation may require.

10. He shall report daily, to the commander, the number, names, quality, and state of the sick under his care, their diseases, and the probable cause of the increase of the sick ; also, the result of his treatment, agreeably to form E. He shall likewise deposit in the binnacle an alphabetical list of those who are or ought to be excused from duty in consequence of wounds, disease, or other injuries.

11. The day previous to the discharge of a man from the sick report, *who had been subsisted by him*, he shall inform the purser in writing, in order that his steward may include him in his mess, in serving out the rations.

12. He shall at all times be prepared with every thing necessary for the relief of wounded men ; and when the ship is cleared for action, he shall repair to the cockpit with his assistants and attendants, or to such part of the ship as the surgeon, with the consent of the commander, may consider most proper for their reception, the situation having been previously arranged.

13. A variety of cases may occur where, for the preservation of the lives of the sick, as well as for the safety of those who are well, it may be considered necessary to remove part of the sick on the gun deck: it is therefore deemed proper that he should recommend their removal whenever circumstances may make it necessary.

14. Every patient, on being sent to the sick birth, shall, if practicable, be washed with soap and warm water; and when there is any suspicion of infection, they shall be furnished with a clean shirt and bedding; the blankets and clothes which they had used should be immersed in boiling water, in which potash has been dissolved; whence they are to be taken, washed and dried, before they are returned to the men's chests or bags. The mattresses should be cleansed and frequently exposed to the sun and air.

15. He shall keep, or cause to be kept, a journal, according to the form F, of the state of the weather, number, names, age, rank, disease and treatment, when placed on the sick list, discharged therefrom, or death; noting likewise the number of days that the patient was victualled from the medical department; also, such remarks on the probable origin of the disease prevailing on board, with a topographical account of the vicinity of anchorages, and such other professional observations as may have a tendency to benefit the public service. This journal he shall forward to the secretary of the navy, inspected by such of the surgeons of the navy as the secretary of the navy may direct, at the end of every cruise, or whenever he shall be transferred to another vessel.

16. When sick or wounded men shall be sent to any of the naval hospitals of the United States, they shall be accompanied by an officer and an assistant surgeon, to see that they are conveyed with all the care and comfort that circumstances will admit of.

17. Each man sent to the hospital shall be furnished with a sick ticket, agreeably to form G, and also an inventory of his effects, agreeably to form H.

18. Whenever very important or difficult cases occur, he shall, if practicable, consult with the surgeons of the fleet.

19. He shall instruct his assistants and all others stationed with him, in the use of the tourniquet, and such other persons as the commander may appoint. A number of tourniquets shall be distributed to the different quarters, also two or three to each top, that the wounded men may suffer as little as possible from the loss of blood before their removal to the cockpit.

20. He shall, occasionally, inspect the crew, and take every precaution to prevent the origin or progress of contagion; on the appearance of which, he shall, without delay, report the case to the commander, in order that a timely separation may be made

of the sick from the well, and adopt such measures as may have a tendency to arrest the progress of the disease.

21. He shall, frequently, inspect the provisions and liquors which may be served out, and report the same to the commander when unsound. He shall likewise direct his mates to examine the cook's coppers, to see that he keeps them clean, and likewise report every thing respecting diet, dress, want of personal cleanliness, in short, every thing which may come within the sphere of his knowledge, tending to promote the comfort and health of the crew.

22. He shall take care that the medicines, and all other articles with which he is supplied, are faithfully administered for the relief of the sick and wounded, and that no part of them be wasted or embezzled, or applied to any other purpose than that for which they were intended.

23. To enable the surgeon and his assistants to take proper care of the articles belonging to the medical department, a storeroom shall be allotted for their reception, which shall be solely under the charge of the surgeon, or, during his absence, of his first assistant.

24. When a ship comes to anchor at any port, he shall make out a requisition for a supply of fresh provisions and vegetables, fruit, including lemons, limes, or oranges, or such other articles as the place may afford, which he may deem proper for the use of the sick and convalescent; which requisition, being approved by the commander, shall be purchased by the purser, and the amount charged to the medical department.

25. Whenever the surgeon shall consider that a supply of fresh provisions, vegetables, or lemons, is necessary for the crew generally, he is to signify the same to the commanding officer.

26. The surgeon shall be allowed a faithful attendant to issue, under his direction, all supplies of provisions and hospital stores, and to attend to the preparation of the nourishment for the sick.

27. The purser shall, from time to time, supply, on the requisition of the surgeon, approved by the captain or commander, such articles of provisions as he may require for the use of the sick or convalescent; which articles shall be charged to the medical department, or against the rations of the sick which may have been stopped.

28. At the expiration of every cruise, the surgeon shall report to the Secretary of the Navy the conduct of his mates; whether they have performed their duties with ability, zeal, and industry. Surgical instruments are to be delivered to the surgeon, and charged to his account; and on his removal from the ship, he is to take a receipt from his successor, the medical purveyor, or the surgeon of the hospital, when the ship may be laid up; which receipt, when approved by the captain, shall acquit him from further responsibility respecting them.

Surgeon's Mates.

1. They shall be subject to the orders of the surgeon. They shall weigh or measure every article of medicine and hospital stores issued. They shall keep a journal of the diseases and treatment of all cases; an abstract of which shall be given to the surgeon, that he may be enabled to report thereon to the Secretary of the Navy at the expiration of every cruise.

2. They shall be careful to see that the medicines prescribed are administered as directed, and that the sick are supplied with proper nourishment. They shall be particularly careful in directing the lob-lolly boy to keep the cock-pit clean, and every article therein belonging to the medical department. They shall under the direction of the surgeon, personally apply dressings to wounds and ulcers, perform the operation of blood-letting, and, in all important cases, they are personally to administer the medicines prescribed, or see them given; and do all other duties appertaining to their profession, which the surgeon may direct.

3. They must direct the orderlies to wash all bandages and compresses, daily, in hot water with soap or potash, and see that they are returned clean and dry to the cock-pit.

4. In the absence of the surgeon, the mate eldest in commission shall act as surgeon. They shall likewise aid in preparing the necessary reports required by the rules and regulations of the navy.

The Surgeon of the Fleet, or Hospital Surgeon.

1. The surgeon of the fleet is to be on board the hospital ship, if there be one in the squadron; if there be not, he is to be on board such ship, or at such place on shore, as the commander in chief shall direct. He is to visit the patients regularly, morning and evening, and oftener, when the nature and urgency of their complaints may render it necessary.

2. All surgeons, surgeons' assistants, and other persons appointed to attend the sick, shall be under the orders of the surgeon of the fleet; and the arrangement of every thing relating to the part of the ship appropriated for the reception of the sick, shall be under his direction. He is to propose to the captain every thing which he may think likely to be of service to the sick, to increase their comforts, or to accelerate their cure—and, as far as circumstances may admit, the captain is to comply with his proposals.

3. If any men be sent to the hospital ship with such hurts or diseases as might be cured without danger or inconvenience in the ships they belonged to, he is to refuse to receive them, and to desire the officers who conducts them to take them back to their ship.

4. He is to visit the ships of the squadron frequently, and inquire into the health of the ship's companies and the treatment of the sick, and where he finds them sickly he is to visit them as often

as circumstances will admit, to discover, if possible, the cause of their sickness, and to advise such measures as may remove it.

5. He is, whenever he shall see occasion, to inquire into the practice of the surgeon of the ship he visits, and his manner of treating the diseases of the men under his care, and to give him such directions as he may deem necessary.

6. He is, whenever he may think it necessary, to examine the instruments, medicines, and necessaries on board any ship; and if he finds them bad in quality or deficient in quantity, he is to report the same to the commander in chief, that he may take such measures as circumstances may require.

7. He is, once every week, at least, if weather and other circumstances will admit, to report to the commander in chief the state of the sick in the hospital ship, and, as far as he shall have been able to obtain information, the general state of the sick in the fleet. He is to specify particularly in his reports, those ships which, from the unhealthiness of their crews, appear to be least fit for active service and most in want of refreshments, and he is to point out whatever he may think necessary for the recovery of the health of the crew of a ship particularly sickly, or for the preservation of the health of the fleet in general. He shall also report quarterly to the navy department. These reports to conform to form I.

8. He is to consider the 2d article of the regulations relative to naval surgeons and their assistants, as applicable to him, and is to govern himself accordingly, observing the forms B, C, and D.

9. He shall keep a journal as per form K, a copy of which he shall, once a year or oftener, if required, transmit to the secretary of the navy.

10. On discharging any person from hospital, he shall give him a certificate according to form M, upon the back of form L, stating when he was received, when discharged, the amount received by him during the time he was in hospital, &c.

Articles.	Brigs.				Sloops of war.				Frigates, (36)				Frigates, (44)				Seventy-four.			
	No.	lb.	oz	dr	No.	lb.	oz	dr	No.	lb.	oz	dr	No.	lb.	oz	dr.	No.	lb.	oz	dr.
Calomel ppt.	.		8		.		14		.	2			.	2	8		.	3	8	
Pulv. jalap	.		4		.		7		.	1			.	1	4		.	1	12	
rhæi	.		3		.		5		.		12		.		15		.	1	4	
ipecac.	.		4		.		7		.	1			.	1	4		.	1	8	
cantharidis	.		4		.		7		.	1			.	1	4		.	1	12	
cinchon. flav.	.	6			.	10	8		.	20			.	25			.	36		
colombæ	.	1			.	1	12		.	4			.	5			.	7		
semn. lini	.	25			.	44			.	100			.	125			.	200		
fol. digitalis	.			4	.			7	.		2		.		2		.		3	
sabinæ	.		2		.		3	4	.		3		.		10		.		14	
gum arabic	.		8		.		14		.	2			.	2	8		.	3	8	
antimonialis	.		1		.		1	6	.		4		.		5		.		8	
gallæ	.		3		.		5		.		12		.		15		.	1	4	
gentian	.	1			.	1	12		.	4			.	5			.	7		
Sulphas sodæ	.	10			.	17			.	40			.	50			.	60		
alumen	.	1			.	1	12		.	3			.	5			.	7		
cupri	.		1		.		1	6	.		3		.		4		.		6	
ferri	.		1		.		1	6	.		4		.		5		.		8	
zinci	.		3		.		14		.	2			.	2	8		.	3	8	
Super tartris potassæ	.	2			.	3	8		.	6			.	10			.	12		
Nitras potassæ	.		12		.	1	5		.	3			.	3	10		.	5		
Tartris antimonii	.		1		.		1	6	.		3		.		4		.		6	
Carbonas, potassæ pur.	.		6		.		10		.	1	4		.	1	8		.	2		
ammoniæ	.		3		.		5		.		12		.		15		.	1	12	
calcis	.	1			.	1	12		.	4			.	5			.	7		
magnesiæ	.		4		.		7		.	1			.	1	4		.	1	12	
Murias ammoniæ	.	1	8		.	2	10		.	6			.	7			.	10		
Sub boras sodæ	.		4		.		7		.	1			.	1	4		.	1	12	
Rad. serpent. virg.	.		8		.		14		.	2			.	2	8		.	3	8	
zingiber	.		4		.		7		.	1			.	1	4		.	2		
senek	.		6		.		10	4	.	1	8		.	1	14		.	2	8	
scillæ mar.	.		3		.		5		.		12		.		15		.	1	4	
Tinct. opii	.	1			.	1	12		.	4			.	5			.	7		
myrrh	.		12		.	1	5		.	3			.	3	8		.	5		
guaic	.	1			.	1	12		.	4			.	5			.	7		
cinchon. comp.	.	1			.	1	12		.	4			.	5			.	7		
digitalis	.		4		.		7		.	1			.	1	4		.	1	12	
opii camphor	.	1			.	1	12		.	4			.	5			.	7		
Spiritus. ætheris. nitros	.	1			.	1	12		.	4			.	5			.	7		
Aq. ammoniæ	.	1			.	1	12		.	4			.	5			.	7		
Sp. lavendul. comp.	.		12		.	1	5		.	3			.	3	8		.	5		
Acid. sulph. aromat.	.	1			.	1	12		.	4			.	5			.	7		
Gum opii	.		4		.		7		.	1			.	1	4		.	2		
camphor	.		6		.		10	4	.	1	8		.	1	14		.	2	10	
guaic	.		4		.		7		.	1			.	1	4		.	1	8	
kino	.		8		.		14		.	2			.	2			.	3		
aloes	.		1		.		1	6	.		4		.		5		.		6	
gambog	.			4	.			7	.		1		.		2		.		3	
ammon	.		4		.		7		.	1			.	1	4		.	1	12	
myrrh	.		6		.		10	4	.	1	8		.	2			.	2	8	
Empl. cantharidis	.	2			.	3	8		.	8			.	10			.	12		
adhæsiv	.	1			.	1	12		.	5			.	5	8		.	8		
merc. c. gum.	.		4		.		7		.	1			.	1	4		.	1	12	
Fol. senna	.		8		.		14		.	2			.	2	8		.	3		
Manna	.	1			.	1	12		.	4			.	5			.	6		
Capsicum	.		2		.		3	4	.		8		.		10		.		14	

Articles.	Brigs.				Sloops of war.				Frigates, (36)				Frigates, (44.)				Seventy four.			
	No.	lb	oz	dr	No.	lb	oz	dr.	No.	lb.	oz	dr.	No.	lb.	oz	dr.	No.	lb.	oz	dr.
Sacchar. alb.		6				10	8			20				25				30		
Ol. menthæ pip.			1				1	6			4				5				6	
terebinth		2				3	8			6				8				10		
Olivar (bottles)	2				4				8				10				14			
succini				4				7			2				2	4			3	
ricini (bottles)	3				5				12				15				20			
Semn. sinapsis		1				1	12			4				5				7		
Acetis plumbi		1	8			2	10			6				7				10		
Mel. dispum		2				3	8			8				10				14		
Flor. sulph.		1				1	12			4				5				10		
Flor. anthem. nobil.			8				14			2				2	8			3	8	
Nitras. argenti				4				7			2				2	4			3	
Hydrargyr. nitr. rub			6				10	4		1	8			1	12			2	8	
Hydrargyrus mur. corr.			1				1	6			4				5				6	
Bals. capivi			4				7			1				1	4			1	12	
Amylum			8				14			2				2	8			3	8	
Sap. castil		2				3	8			8				10				14		
Pix. burgund.		1				1	12			4				5				7		
Nuc. moschat			2				3	4			8				10				12	
Cort cassiæ			6				10	4		1	8			1	14			2	10	
elemi		1				1	12			4				5				7		
Cera flav.		1				1	12			4				5				7		
Extr. glycyrrh		2				3	8			6				8				10		
Conserv. rosar			8				14			2				2	8			3		
Lapsis septicus				4				7			2				2	4			3	
Sol. min Fowleri			4				7			1				1	4			1	12	
Ung. simplex		6				10	8			24				30				42		
basilic		4				7				16				20				28		
merc. fort		6				10	8			20				25				35		
Hydrargy rub.		3				5				8				10				15		
Acid. muriat. oxyg.			6				10	4		1	8			1	14			2	10	
Pulv. carbonis		2				3	8			8				10				14		
Fumigating Articles.																				
Manganese per oxid			12			1	8			2				3				5		
Acid. sulphur			10			1				4				6				10		
Nitras potassæ		1				3				6				9				12		
Murias sodæ		5				8				15				35				55		
Instruments, &c.																				
Amputating cases	1				1				2				2				2			
Trepanning do.	1				1				1				1				2			
Dissecting do.	1				1				1				1				2			
Pocket dressing (set)	1				1				2				2				3			
Curved needles & case	4				6				12				18				24			
Tourniquets	6				8				18				24				30			
Bullet forceps (pair)	1				1				1				1				1			
Seton needle	1				1				1				1				1			
Flexible metall. probes	1				1				2				3				3			
Probang	1				1				2				2				2			
Scarificator—6 cups	1				1				1				1				1			
Elastic catheters	1				1				2				3				3			
Elastic bougies	2				3				4				4				6			
Silver catheters	1				1				2				3				3			
Common bougies	18				25				36				48				60			
Teeth instruments (set)	1				1				1				2				2			
Flat trochars	1				2				2				2				2			

A—continued.

Articles continued.	Brigs.	Sloops of war.	Frigates, (36.)	Frigates, (44.)	Seventy-four.
	No.	No.	No.	No.	No.
Thumb lancets	6	8	10	12	18
Spring do.	1	1	2	2	3
Spare phlemes for do.	2	3	6	6	8
Bellows and elastic tube for suspended animation	1	1	1	1	1
Needles, common	25	50	75	100	125
Trusses	4	4	6	8	12
Coarse pasteboard sheets	2	4	6	8	10
Sets of Dessault's splints, improv'd	2	3	4	4	6
Coarse muslin, yards	20	35	60	90	120
flannel, do.	6	9	15	20	30
Patent lint, lbs.	1	1½	3	5	7
Common lint, lbs.	3	5	10	15	20
Clean linen rags, lbs.	6	9	15	20	30
Strong fine thread, oz.	1	1½	2	2	3
Sheep skins	2	3	5	7	12
Common scissors, pair	1	1	1	1	1
Papers of pins	1	1½	2	3	5
Pieces of tape	2	3	4	4	6
Oil cloth, yards	3	4	6	9	12
Carded tow, pounds	4	6	9	12	15
Pillows for fractures	2	2	2	4	4
Towels for cockpit	4	4	6	9	12
Red binding, yards	4	6	9	12	15
Webbing, pieces	1	1	1	2	2
Sponge,	4 oz.	6 oz.	10 oz.	14 oz.	1 lb.
Penis syringes	12	18	24	30	48
Glyster do.	1	1	1	2	2
Pewter urinals	1	2	2	2	3
Spatula	2	2	2	2	3
Fire do.	1	1	1	1	1
Apothecary's scales and weights	1	1	1	1	2
Tiles	2	2	2	2	3
Marble slab	–	–	1	1	1
Wedgewood mortars	1	1	1	1	2
Marble do.	1	1	1	1	1
Vials, assorted, doz.	3	5	8	12	18
Corks, do. doz.	12	15	18	24	30
Graduated measure	1	1	1	1	2
Funnel	1	1	1	1	2
Papers of pill boxes	1	2	3	4	6
Gallipots, nests	4	5	6	8	12
One nest of crucibles	–	1	2	2	3
Wrapping paper, quires	6	8	12	15	24
Hone	1	1	1	1	1
Stationary.					
Writing paper, quires	4	6	9	12	18
Quills	25	50	50	75	100
Ink powder	2	2	2	3	4
Ink standish	1	1	1	2	2
One blank book for journals	3 qr. 1	4 qr. 1	5 qr. 1	5 qr. 1	6qr. 1
One hospital stores	2 1	2 1	2 1	2 1	2 1
One daily expenditure	1 1	1 1	1 1	1 1	1 1

A—continued.

Articles.	Brigs.			Sloops of war.			Frigates, (36.)			Frigates, (44.)			Seventy-four.		
Hospital stores.	No.	gs.	lbs.	No.	gs.	lbs.	No.	gs.	lbs.	No.	gs.	lbs.	No.	gs.	lbs.
Brandy		10			10			20			32			45	
White wine		32			50			64			80			120	
Port wine, bottles	12			72			120			144			175		
Porter, do.	36			60			108			140			175		
Brown sugar			100			175			250			400			600
Loaf sugar			12			20			30			45			50
Chocolate			25			45			70			85			100
Young hyson tea			15			25			35			45			60
Barley, common			40			60			80			120			150
Sago			10			17			25			35			50
Arrow root			6			9			12			15			20
Tapioca			6			9			12			15			20
Oat meal, *kiln dried*,			15			20			30			45			60
Indian corn meal, do.			180			280			320			400			600
Rice flour			9			12			15			18			25
Rice in grain			25			40			60			85			100
Portable soup			6			10			12			15			20
Pepper			1			1½			2			2½			2¾
Alspice			½			¾			1			1⅛			1½
Cloves			4 oz			6 oz			8 oz			10oz			12oz
Tamarinds			12			20			30			50			75
Raisins			25			40			50			65			80
Molasses					18			32			45			60	
Mustard in bottles	2			4			6			12			18		
Essence of spruce, pots	12			18			20			24			30		
Lemon juice		10			15			25			32			50	
Eggs				240			360			500			700		
Soap			50			80			120			150			200
Potash			15			20			25			30			45
Spermaceti candles			12			15			20			20			25
Small quantity of herbs, conditionally supplied, at the discretion of the purveyor.															
Hospital Utensils.															
Pint cups, tin	4			6			12			18			24		
Camp kettles	1			1			2			2			3		
Teakettle	1			1			1			1			1	of 4	gals.
Large teapots	1			1			1			2			3		
Table spoons	6			8			12			18			24		
Tea spoons	6			8			12			18			24		
Medicine cups, American man. earthen ware	12			15			24			36			48		
Demijohns	1			2			2			3			3		
Tin canisters	3			3			3			4			6		
Scales & wts. for hos. store	1			1			1			1			1		
Tin meas. qt. pt. ½ pt. set	1			1			1			1			1		
Funnels	2			2			2			2			3		
Saucepans	1			1			2			2			3		
Nutmeg grater	1			1			1			1			1		

Bedding.	No.	No.	No.	No.	No.
Hair mattresses	–	–	6	12	16
Sheets	–	–	20	36	48
Pillows	–	–	6	12	16
Pillow cases	–	–	12	24	32
Night caps	–	–	12	24	32
Bed pans	1	1	1	1	2
Cockpit Furniture.					
Large table	–	–	1	1	1
Chairs	–	–	3	3	4
Tin sconces	–	–	4	6	8
Snuffers	–	1	1	1	2
Candlesticks	–	–	2	2	3
Glass lantern	1	1	1	1	1
Bleeding cups	2	2	2	2	3
Basins	1	1	1	2	2
Hand bell	1	1	1	1	1
Dispensatory	1	1	1	1	1

B

Return of the Receipt and Expenditure of Medicines and other articles on board the ——————, commanded by ——————. Dated this ——— day of ———.

Names of Medicines.	Remaining at the last return.			Received since. At ———, 18 .			At ———, 18 .			At ———, 18 .			At ———, 18 .			Total.			Expended.			On hand.			
Medicines and Utensils.	lbs.	oz.	dr.	lbs	oz.	dr.	lbs.	oz.	dr.	lbs.	oz.	dr.	lbs.	oz.	dr.	lbs.	oz.	dr.	lbs.	oz.	dr.	lbs.	oz.	dr.	
Note. In this column the names of all the medicines, &c. allowed must be inserted. (See estimate.)																									

I, , surgeon of the United States , do certify and declare, on my honour, that the above is a true exhibit of the medicines and other articles received, expended, and remaining on board the said , and that the articles expended were, to the best of my knowledge and belief, appropriated solely to the use of the sick and convalescents. Given under my hand, this day of , 18 .

SURGEON.

C

Daily account of the Expenditure of Provisions and Hospital Stores on board the United States —— the ——, by ——, surgeon.

18 .	Victualled.	Fresh meat.	Portable soup.	Navy bread.	Flour	Rice.	Tea.	Chocolate.	Brown sugar.	Loaf sugar.	Brandy.	White wine.	Port wine.	Whiskey.	Barley.	Sago.	Arrow root.	Tapioca.	Oatmeal.	Indian meal.	Rice flour.	Molasses.	Pepper	Alspice.	Cloves	Tamarinds.	Raisins.	Mustard.	Essence spruce.	Lemon juice.	Eggs	Fowls.	Soap.	Potash.	Spermaceti candles				
DATE.	No.	lbs.	oz.	lbs.	lbs.	oz.	oz.	lbs.	lbs	oz.	oz	pts.	bottles	qts.	pts.	oz.	oz.	oz.	oz.	lbs.	oz	pts.	oz.	oz.	oz.	oz	lbs.	oz.	bottles	pts	qts.	pts.	No	No.	lbs.	lbs.	lbs.				

TABLES B and C.

D

Form of a Ledger of a Steward of a Hospital.

DR. FRESH MEAT.

18 .	lbs.	oz.		Amount. dolls.	cts.	18 .		For	lbs.	oz.		Amount. dolls.	cts.
To ——, (butcher,) for ——, at ——,							By expenditure this month as per daily issue book						

And so on, for every article of provisions and *hospital stores*—having also an account opened for *incidental* expenses; for wood and coal: for furniture; with each person employed in the asylum; with the medical department for medicines, &c. paid for by him; an account for each article of clothing, and cash account.

E

Naval Surgeon's daily return to his Commanding Officer.

No.	Names.	Rank.	Disease.	State of Sick.	Remarks.

F

Form of a Medical Journal for a Ship of War.

	State of the Weather.	No.	Names.	Age.	Rank.	Disease.	Symptoms and treatment.	When placed on the sick list.	When disch'd or sent to a hospital.	Decease.	Number of days victualled.	Remarks.

TABLES D, E, and F.

G.

Form of a Ticket, to be sent with persons ordered to a hospital.

To ———, hospital surgeon at ———.

You are hereby requested to receive ———, affected with ———, into the hospital under your direction, and provide for him such medicines and comforts as his case may require, according to the rules and regulations of the navy. He has taken the following necessaries with him:

H.

Beds.	Chests.	Bags.	Coats.	Waistcoats.	Jackets.	Drawers.	Trousers.	Pair of sheets.	Blankets.	Pair stockings.	Shirts.	Handkerchiefs.	Pair shoes.	Hats.	Caps.	Books.	Watches.	Buttons.	Shoe buckles.	Knapsacks.	Socks.	Gaiters.	Cash.

Commander of the

Surgeon of the

I certify that I have received the above articles belonging to me, on receiving my discharge from the hospital.

I.

Report of Patients, by ———, *Hospital Surgeon of the Navy at* ———, *made this* —— *day of* ———.

Names.	Rate.	Age.	Disease or injury.	Circumstances under which the wound or disability was received.	To what vessel or station attached.	When admitted.	When discharged.	Death.	Desertion.	No. of days in hospital	Where or to what ship sent.	Whether fit subjects for naval asylum.	Miscellaneous remarks.	Names of assistants.	Rank.	Monthly pay. dolls.	Monthly pay. cts.	Summary of hospital return.	Summary of hospital return. No.	Summary of hospital return. No.	Remaining. Sick and wounded.	Remaining. Convalescent.	Remaining. Total.

TABLES G, H, and I.

K

Form of a Medical Journal for a Naval Hospital.

Date of admission.	No.	Names.	Age.	Rank.	Disease.	Present symptoms, progress of disease, and treatment.	Issue.	State of the weather.

L

Sick ticket,
Unserviceable ticket, or
Foreign remove ticket. } Not saleable or transferable.

No. on the ship's books
( )

No. on the entry book
( )

Full wages, at, per month, $

Abatement,
Hospital fund,
Asylum fund,
stoppages,

Nett wages, $

———, aged —— years, —— feet —— inches high, of a —— complexion, entered on board the ———, on the —— day of ——, 18 , and served until this —— day of ——, 18 , in quality of ———; at which time he was ——.

Abatement to be made.

dolls. cts.

For advance on entering,
For service,
Navy clothes,
Dead men's clothes,

$

Amounting to ——— dollars and ——— cents.
Given under our hands, this ——— day ———, 18 .
Commander.
Purser.

M

United States Naval Hospital at ———

These are to certify, that the within named ———, was received at the United States naval hospital under my charge, on the ——— day of ———, one thousand eight hundred and ———; and was discharged on the ——— day of ———, 18 : during which time he has received from ———, purser on this station,

Slop clothing to the amount of $

Tobacco,

$

Amounting to ——— dollars and ——— cents.

Witness my hand, this ——— day of ———, 18 .

Hospital Surgeon.

GENERAL INSTRUCTIONS FOR WARRANT OFFICERS.

1. The warrant officers of the United States vessels of war, when in ordinary, are to examine frequently, the condition of the state rooms appointed to receive their respective stores, are to inform the master shipwright of the yard, of any defects in them which may require to be repaired, that they may be fit to receive the stores whenever the ship shall be put in commission: and when any ship is commissioned, the warrant officers are to use their utmost endeavours to get their stores on board as expeditiously as the other duties, necessary to the equipment of a ship, will permit.

2. When they receive stores on board, whether at the fitting out of the ship, or on any subsequent supply, they are to be very particular in ascertaining that they are of good quality, and that they receive the full quantity specified in the note or memorandum sent with them; and they are immediately to report to the captain any defect or deficiency which they may discover in them.

3. They are to keep an account, according to the forms delivered to them, of the receipt, expenditure, (expressed in words and not in figures,) condemnation by survey, or supplying of stores always specifying the place, and the person from whom the stores are received, or the person to whom they are supplied.

4. No waste of stores, not perishable, will never be allowed, except from unavoidable accidents, which are to be particularly mentioned in the log-book, wherein the quantity of every article is to be specified. Two of the principal officers present at such accident are to certify that it did happen; and if the quantity of stores lost be considerable, the quantity remaining is to be ascertained by survey.

5. If stores of any description be lost or damaged through neglect, or by the misconduct of any officer, or other person, the officer having the charge of such stores is to report such misconduct or neglect to the captain, that the value of the stores may be charged against the wages of the delinquent.

6. Every officer shall be responsible for the conduct of his yeoman. He is most carefully to avoid the setting down of any stores as expended, which have not been used, or the stating them as having been expended for any other purposes than those to which they were actually applied.

7. Every officer shall be responsible for any errors he makes in his accounts, and he shall pay out of his wages the full value of all stores not properly accounted for, or improperly expended, unless he shall produce an order from his captain to expend them in a manner contrary to the regulations contained in these instructions and the established practice of the service.

8. Officers are not to suffer the yeoman to take stores from the store rooms without their express order. They are frequently to examine the quantity remaining, and if they have doubts of its being as great as it ought to be, they are to apply for a survey thereon.

9. When they are supplied with stores, by other officers, whether of the same ship or any other, they are to charge themselves with such stores, and are to mention their having done so in the receipt they give for them.

10. One officer shall not supply another with stores, nor lend any, without an order, in writing, from the captain, and when he does supply or lend them, he is to demand a receipt, in which the quantity of every article is to be written in words at length, in which is to be mentioned by whose order they weresupplied ; and he is also to give under his hand, to the officer supplied, a voucher of delivery, specifying the stores as particularly as in the receipt.

11. Officers when appropriating rope, canvass, or any other article to use, are to be very attentive to conform to the established length and other dimensions of whatever it may be intended to make.

12. When they convert stores to any other use than that for which they were originally intended, they are to enter them in their accounts, as having been so converted, and are to charge themselves with whatever they convert them into.

13. When masts, sails, colours, or other stores are blown away or lost, they are to be very particular in the quantity they expend in that manner, as they will probably be required to make oath to the truth of that part of their accounts.

14. When stores are damaged or worn out, the officer who has charge of them, is to apply to the captain to have them surveyed, and after they are surveyed, he is to be careful to apply them to whatever use the surveying officers shall appoint, charging him-

self with those articles into which he may be directed to convert them.

15. They are to visit their store rooms very frequently, to see that they are kept clean, that they are well aired, and that the stores are so arranged as to admit of their being easily got at when wanted.

16. They are never to carry, nor to suffer others to carry, lights in their store rooms, except in good lanterns, the doors of which are never to be opened in the store rooms

17. They are strictly charged not to put into the magazine, the wings, or any of the store rooms, any wine or spiritous liquors, nor to keep any quantity in their cabins, except such as the captain shall expressly permit.

18. When the ship is to be dismantled, either for the purpose of being refitted or paid off, they are to be particularly careful in preventing their stores, rigging, &c. from being cut, or in any other way damaged. They are to see that all the stores they send from the ship are tallied, and very carefully put into the boats or vessels which are to carry them, and to take every possible precaution to prevent their receiving damage on their way to the store houses.

19. When a warrant officer is about to be removed from a ship, or when he wishes to pass his accounts, which he will be allowed to do at the expiration of every twelve calendar months, he is to apply to the captain for a survey on his stores, who will obtain from his commanding officer an order for that purpose ; or, if he should have no immediate commanding officer, will himself order the survey, that the quantity of stores remaining on board may be correctly ascertained.

20. When a warrant officer dies, the captain is immediately to apply to the commanding officer present, to order, or, if the ship be alone, he is himself to order, a survey on the stores remaining on board ; one copy of the report of such survey is to be sealed up with the papers of such deceased officer, and another copy is to be delivered to his successor to be considered as his first charge.

21. As all warrant officers may at times be called to survey stores, they are strictly charged to perform that duty with the utmost attention, and to make all their reports with the strictest truth and impartiality, so that when called on they may be able, conscientiously, to make oath to the correctness of the report they may have made.

22. When ordered to survey stores represented as being unfit for service, they are to examine every part of them very carefully, and if they find them unfit for the service for which they were originally intended, they are to point out in their report any other service to which they may be appropriated.

23. When ordered to survey stores for the purpose of ascertaining their quantity ; whether to enable the officer in whose charge they are placed, to pass his accounts, or to transfer them from one officer to another, they are not to take any account of them.

but as far as it shall be possible for them to do so, they are themselves to ascertain the real quantity.

The Gunner.

1. The gunner having received directions for that purpose, from the captain, is to inform the officer having charge of ordnance, when the ship will be ready to receive her guns. He is to attend to receive them on board, and to see that every gun is put into its proper carriage, and placed in its proper port. No. 1. being the foremost gun, on the larboard side, and No. 2, the foremost gun, on the starboard side, on each deck.

2. He is, whenever other duties will admit, to employ his mates and the men of his crew, in fitting the breechings and tackle, that they may be ready for the guns when received on board.

3. He is to examine very carefully into the state of the magazine, that he may be certain of its being properly fitted and perfectly dry before the powder is carried on board; but if he should find any appearance of dampness, he is to report it to the captain, that it may be properly dried.

4. He is to inform the captain when the powder will be ready to be sent on board, that the fire in the galley may be put out before the vessel which carries it is suffered to come alongside. While the powder is taking into the ship, no candles are to be kept lighted, except those in the light room; nor is any man to be allowed to smoke tobacco. As soon as the whole is stored in the magazine, the gunner is to see the doors, the light room, and the scuttle carefully secured; and is to deliver the keys to the captain, or to such other officer as he shall appoint to take care of them.

5. He is never to go into the magazine without being ordered. He is never to allow the doors of the magazine to be opened by any but himself. He is not to open them until the proper officer is in the light room; and he is to be very careful in observing that the men who go into the magazine have not about them any thing that can strike fire.

6. He is never to keep any quantity of powder in any other part of the ship than the magazine, except that which the captain shall order to be kept in the powder boxes or powder horns, on deck; and when he delivers cartridges from the magazine, he is to be very particular that they are in cases properly shut. And whenever it may be necessary to remove powder from the ship, he is to use the utmost caution that all the passages to the magazine may be wetted, so as as to prevent accidents.

7. He is to turn the barrels of powder once at least in every three months, to prevent the separation of the nitre from the other ingredients of the powder. He is also to examine frequently the barrels, and if he should find any of them defective, he is to remove the powder into some of the barrels which have been emp-

tied. He is frequently to examine the cartridges which are filled, that he may remove the powder from any of them which he may find defective.

8. When powder of various qualities shall be sent on board, he is to be very attentive in using them in the order which shall be prescribed.

9. When any extra quantities of stores or ammunition are supplied for foreign service, he is to be careful to use those first which have been the longest time on board, unless he shall receive particular directions to the contrary.

10. He is frequently to examine into the state of the guns, their locks and carriages, that they may be immediately repaired or exchanged, if found defective, and he is frequently to examine the musketry and all the other small arms, to see that they are kept clean and in every respect fit for service.

11. He is to be attentive in keeping the shot racks full of shot, the powder horns and boxes of priming tubs full, and a sufficient quantity of match primed and ready for being lighted at the shortest notice.

12. Guns received from the ordnance stores shall be scaled before they are loaded for service, and if it shall be necessary to scale them at any other time, the gunner shall represent to the captain, who is to give an order for that purpose, in which the cause of its being done is to be particularly specified.

13. When a ship is preparing for battle, he is to be particularly attentive to see that all the quarters are supplied with every thing necessary for the service of the guns, the boarders, firemen, &c. He is to see all the screens thoroughly wetted, and hung round the hatchways, and from them to the magazine, before he opens the magazine doors.

14. He is, during an action, to take all opportunities of filling powder, that there may be no cessation of firing for want of ammunition; and he is to be attentive to send out cartridges with the quantity of powder reduced or increased as the captain shall have directed.

15. After an engagement he is to apply to the captain for a survey on the powder, shot, and other stores, remaining under his charge, that the quantity expended in the engagement may be ascertained.

16. He is to be careful in keeping the boxes of hand grenades and grape shot in dry places, and to expose frequently the grape shot to the sun and wind, to prevent the bags from being milldewed. He is never to start the hand grenades, but is to return those which are not used in the boxes in which he received them.

17. He is never to allow any match to be burnt in the day, nor more than two lengths at the same time in the night, without an order from the captain. When a match is burning, it is always to hang over water in tubs, and the gunner's mate of the watch is to attend it.

18. If a detachment of seamen or marines, shall, at any time, be sent from the ship, the gunner is to make out an inventory of the arms, ammunition, and stores which are sent with it, which is to be signed by the officer appointed to command the detachment, and to be witnessed by the captain's clerk, who is to examine the quantity supplied, and on the return of the detachment, the gunner, in presence of the officer who commanded it, and the captain's clerk, is to examine the arms, &c. which are brought back, and to report the deficiency, if any, in each article to the captain, who, from the manner in which the officer shall account for such deficiency, will determine whether it be proper to allow the articles to be expended by the gunner in his accounts, or charged against the pay of the officer or any person under him, by whose carelessness or misconduct the whole, or any part of them was lost or destroyed.

19. When a salute is to be fired the gunner is to be very attentive to take such precautions in drawing the guns as may ensure there not being a shot in any of them, and if vessels of any description be so near as to risk their being damaged by the wads, he is to draw them also, and he is to lay up and point the guns so as to prevent their doing any mischief, although a wad or shot, notwithstanding the precautions taken may have been left in one of them.

20. He is to take every possible precaution to prevent any ball cartridges being given to the men among the blank cartridges issued for exercise.

21. Whenever he shall be directed to strike any guns into the hold, he is to pay them all over with a thick coat of warm tar and tallow mixed together, and having washed the bore of the gun with fresh water and very carefully sponged and dried the inside, he is to put a good full wad, dipped in the same mixture, about a foot within the muzzle, and to see that the tompion is well driven in and surrounded with putty, and he is to drive a wooden stopper tight into the vent, and secure it there.

22. He is to be extremely attentive in examining all the guns, in seeing them carefully drawn and thoroughly sponged before they are returned in store. He is also to examine very carefully the magazine, to see that no loose powder remains in any part of it, after the powder has been returned into store; he is also to be careful that there are no cartridges left in the cartouch boxes, when they are sent on shore.

23. He is to be very attentive to the conduct of the armourer and his mates, to see that they discharge their duty properly; that they keep the muskets and other small arms clean and in good order, always repairing them when they are defective, and not suffering them through neglect to become too bad to be repaired.

24. If, from any extraordinary circumstances, when a ship is on a foreign station, the small arms should be so damaged that they cannot be cleaned or repaired by the armorer, the gunner is to represent their condition to the captain, who is to direct a lieute-

nant and the master to survey them, and if the report shall confirm the representation of the gunner, he is to apply to the commander in chief to give orders for their being repaired, but if the commander in chief be not present, the captain is himself to get them repaired by workmen on shore, being very careful not to pay

TABLE OF THE REQUISITE CHARGES OF ALL PIECES ON ALL OCCASIONS.

Nat. Pounders.	Proof. Brass. lb.	Proof. Brass. oz.	Proof. Iron. lb.	Proof. Iron. oz.	Service. Brass. lb.	Service. Brass. oz.	Service. Iron. lb.	Service. Iron. oz.	Saluting. lb.	Saluting. oz.	Ricochet or Exercise. lb.	Ricochet or Exercise. oz.	Diameter. Gun. In.	Diameter. Gun. Pts.	Diameter. Shot. In.	Diameter. Shot. Pts.	Length of Cart. Proof. In.	Length of Cart. Proof. Pts.	Length of Cart. Service. In.	Length of Cart. Service. Pts.
42	31	8	25	0	14	0	12	0	10	4	4	7	7	018	6	684	26	94	17	79
32	26	12	21	8	10	10	9	4	8	0	2	12	6	410	6	105	26	3	16	25
24	21	0	18	0	8	0	8	0	6	0	2	0	5	824	5	547	25	58	14	78
18	18	0	15	0	6	0	8	0	4	8	1	12	5	292	5	040	..	..	13	46
12	12	0	12	0	4	0	4	0	3	0	1	6	4	623	4	403	23	24	11	72
9	9	0	9	0	3	0	3	0	2	8	1	4	4	200	4	038	21	26	10	63
6	6	0	6	0	2	8	2	8	2	0	1	0	3	668	3	408	18	7	9	35
4	4	0	4	0	1	6	1	8	1	4	0	12	3	205	3	003	16	43	8	12
3	3	0	3	0	1	0	1	0	0	12	0	8	2	913	2	775	14	84	7	42
$1\frac{1}{2}$	1	8	1	8	0	8	0	8	0	6	0	4	2	031	2	220	11	76	5	88
1	1	0	1	0	0	5	0	5	0	4	0	$2\frac{1}{4}$	2	019	1	923	8	35	3	18

more for their repairs than the established price of the country. The gunner is to attend frequently, and the armorer constantly to see that the work is properly done.

25. As the brass sheaves and iron pins of blocks for gun tackle, from being much exposed to salt water, are frequently set fast with rust, he is to be particularly attentive, when this is the case, to cause the iron pins to be knocked out, and to be oiled or greased.

Surveys.

1. All applications for surveys shall be made in writing, to the captain, by the officer who has charge of the provisions or stores to be surveyed, and shall be transmitted by the captain to the flag officer commanding the division of the fleet or squadron to which he belongs, who is to order the surveys applied for to be taken, except in cases which the commander in chief shall reserve for his particular directions. But captains not serving in a fleet or squadron, or, if serving in a fleet or squadron, not being at that time in company with the flag officer commanding the fleet or squadron, or division to which they belong, are to transmit such applications to the senior officer present.

2. The officers employed on surveys are to be one master and two officers of the class to him whose stores are to be surveyed. They are all, if possible, to belong to other ships than that to which the stores to be surveyed belong; but the master of that ship, and the officer who has charge of these stores are to be present to give what information may be required, and to prevent partiality or injustice, or to represent it to the captain, if they perceive, without being able to prevent it. But if there be a necessity for an immediate survey, when there are not a sufficient number of ships present to furnish, or when the sickness of their officers prevents other ships from furnishing the number of officers required, the master of the ship may be ordered to assist at such survey; but if the ship be alone, such survey is to be taken by one of the lieutenants, the master, and one of the master's mates; but in this case a survey shall be taken again, if other ships join company before the surveyed stores, &c. have been disposed of.

3. The report made by officers appointed to survey stores, &c. is to specify by whose order it is taken, and for what purpose; what are the articles ordered to be surveyed; the quantity and quality of those articles remaining on board, or the actual state of any which shall be particularly represented as deficient or defective. The number or quantity is always to be written in words at length, and if any stores complained of be found to be no longer fit for their proper use, the report is to specify whether they be fit for any other, and for what, or whether they be no longer fit for any purpose whatever.

4. If any appearance of neglect shall be discovered by the surveying officers, it is to be particularly noticed in their report whe-

ther it be the officer who has charge of the stores, or any other person who may have been guilty of it. But if an appearance of fraud be discovered, the surveying officers are not only to notice it in their report, but they are also to deliver to the captain a separate report, stating their suspicions of such fraud having been committed, and their reasons for suspecting it.

5. There are to be three copies of all reports of stores, provisions, &c which are surveyed, each signed by all the surveying officers; one of which reports, written on the back of the order for survey, is to be delivered to the officer who has charge of the stores, &c. which are surveyed, one other copy to the captain of the ship to which the stores belong, and the other copy is to be delivered by the captain to the officer by whose order the survey was taken. But when the stores, &c. surveyed, are to be transferred to the charge of another officer, a fourth copy, signed in the same manner, is to be delivered to the officer to whose charge the stores, &c. are to be transferred.

6. The surveying officers are not to direct any stores or provisions to be thrown overboard, except such as by their putrid state may be prejudicial to the health of the ship's company; whatever they find in such state they are themselves to see thrown into the sea before they leave the ship, and they are to mention their having done so in their report; all other stores, not convertible to any use, they are to direct the officer having charge of them to return into store whenever the ship shall enter a port where there is a storekeeper or other officer authorized to receive them.

7. If any officer shall wilfully sign any false report of the quantity or condition of the stores or provisions he is ordered to survey, or shall discover any fraudulent practices in the management of such stores or provisions without making proper mention of them in his report; or if any person shall give any false account of stores or provisions, by which the surveying officers may be deceived and be led to make out an improper report, he is to be immediately suspended and his misconduct reported to the commander in chief or to the secretary of the navy, that he may be tried by a court martial.

8. Surgeons' instruments, medicines, and necessaries for the sick, are to be surveyed by the physician of the fleet or squadron, and two surgeons, or by three surgeons, as the commander in chief shall direct, who are to be very particular in specifying the quantity, quality, and condition of each of them. If among the medicines they should find any not fit to administered, they are to see them thrown overboard. If there shall be a necessity for a survey, when three surgeons cannot be obtained, the commanding officer present may order a surgeon's first assistant to attend as one of the surveying officers.

Convoys.

1. The commander of a squadron or a single ship, appointed to convoy the trade of the United States, must give the proper and necessary instructions in writing, from under his own hand, to all the masters of such ships and vessels as he shall be directed to take under his protection.

2. He is to take an exact list in due form of all the ships and vessels under his convoy, specifying their respective names, and send a copy thereof to the secretary of the navy before he sails.

3. He is not, in time of actual war, to chase out of sight of his convoy, but on the contrary to be watchful of and defend it from attack or surprise; and in case any of the ships or vessels should be distressed, he is to afford them all necessary assistance. He is also to extend the same protection to his convoy when the United States are not engaged in war.

4. If the master of a ship shall misbehave, by delaying the convoy, abandoning or disobeying the established instructions, the commander is to report him, with a narrative of the facts, to the secretary of the navy by the first opportunity.

5. The commander is to carry a toplight in the night, to prevent the separation of the convoy unless on particular occasions he shall deem it improper.

6. He may order his signals to be repeated by as many ships under his command as he may think fit.

7. When different convoys set sail at the same time, or join at sea, they are to keep together so long as their courses lie the same way, and when this happens, the eldest commander shall command in the first post, the next eldest in the second post, and so on according to seniority.

8. Commanders of different convoys are to wear the lights of their respective posts, and repeat the signals in order, as is usual in such cases.

Masters at Arms and Ship's Corporal.

1. They are daily, by turns, as the captain shall direct, to exercise the ship's company.

2. To see the fire and candles put out in season, and according to the captain's order.

3. To visit all vessels coming to the ship, and prevent the seamen from leaving the ship without permission.

4. To acquaint the officer of the watch with all irregularities in the ship, as they shall come to his knowledge.

5. The corporal is to act in subordination to the master at arms, and to perform the same duty under him which he is to perform himself in cases where a master at arms is not allowed.

Midshipmen.

1. No particular duties can be assigned to this class of officers. They are promptly and faithfully to execute all the orders for the public service which they shall receive from their commanding officers.

2. The commanding officers will consider the midshipmen as a class of officers meriting, in an especial degree, their fostering care. They will see, therefore, that the schoolmaster performs his duty towards them, by diligently and faithfully instructing them in those sciences appertaining to their profession, and that he use his utmost care to render them proficients therein.

3. Midshipmen are to keep regular journals and deliver them to the commanding officer at the stated periods in due form.

4. They are to consider it as a duty they owe to their country, to employ a due portion of their time in the study of naval tactics, and in acquiring a thorough and extensive knowledge of all the various duties to be performed on board of a man of war.

Prize Masters.

On board of an armed ship they are considered, in every respect, to be in the same situations as midshipmen and mates of men of war.

They take charge of those stations in which the first lieutenant places them, and are always under the order of some superior officer except when the captain nominates them to the charge of a prize or to some particular duty.

In action, they are in the tops with small arms, and in necessary stations. They are in watch with lieutenants, to pass the word, muster the watch, and see that the orders of the officer of the watch are executed with punctuality and despatch.

They are to prevent all skulking, heave the log, report the rate of her sailing to the officer of the watch, and mark down on the log-board what the officer of the watch directs.

The prize master of the morning watch is to see the hammocks up when piped, and the between decks put to rights and cleaned after breakfast, and report the same, when finished to the lieutenant of his watch, who will inspect and report the same.

In working ship, making and shortening sail, &c. they will be in their respective stations, keeping silence in the crew, and execute the word of command.

They are to keep a reckoning, and send in to the captain, every day at noon, their day's work.

When they have charge of a boat on shore, they are to keep the boat's crew sober, and prevent their deserting or leaving the boat without permission, and execute with despatch the orders intrusted to them, nor are they to allow any liquor to be brought

on board in the boat without permission from the first lieutenant, to whom they will always report their return on board.

The are to have a watch bill and station list constantly in their possession to muster the people when ordered : their other duties depend entirely upon the orders of their superior officers.

Chaplain.

1. He is to read prayers at stated periods ; perform all funeral ceremonies over such persons as may die in the service, in the vessel to which he belongs, or, if directed by the commanding officer, over any person that may die in any other public vessel.

2. He shall perform the duties of a schoolmaster, and to that end he shall instruct the midshipmen and volunteers in writing, arithmetic, and in navigation, and in whatsoever may contribute to render them proficients. He is likewise to teach the other youths of the ship, according to such orders as he shall receive from the captain. He is to be diligent in his office.

3. He shall, when it is required of him, perform the duties of secretary to the commodore.

Captain's Clerk.

He is to keep the captain's logs, and keep an account of the expenditure of stores and provisions. He will write the station-bills, &c. for the officers, do the writing for the ship, and obey the orders of all superior officers.

Ship's Steward.

He is to serve out the provisions to the ship's company under the inspection of the prize master, captain of the forecastle, and boatswain's mate, which will prevent all disputes.

His duty depends upon the orders of his superior officers.

Cook.

1. He is to have the charge of the steep tub, and is answerable for the meat put therein; he is to see the meat duly watered and the provisions carefully and cleanly boiled and delivered to the men, according to the practice of the navy.

2. In stormy weather he is to secure the steep tub, that it may not be washed overboard, but if it should be inevitably lost the captain must certify as to the loss, and the cook is to make oath as to the number of pieces so lost, that it may be allowed in the purser's account.

Regulations to be observed respecting Provisions.

1. Provisions and slops are to be furnished upon the requisitions of the commanding officer, founded upon the purser's intents.

2. The pursers being held responsible for the expenditure, shall, as far as may be practicable, examine and inspect all provisions offered to the vessel, and none shall be received that are objected to by him, unless they are examined and approved of by at least two commissioned officers of the vessel.

3. In all cases where it may appear to the purser that provisions are damaged or spoiled, it will be his duty to apply to the commanding officer, who will direct a survey by three officers, one of whom at least, to be commissioned.

4. If, upon a settlement of the purser's provision account, there shall appear a loss or deficiency of more than seven and a half per cent. upon the amount of provisions received, he will be charged with and held responsible for such loss or deficiency exceeding the seven and a half per cent. unless he shows, by regular surveys, that the loss has been unavoidably sustained by damage or otherwise.

5. Captains may shorten the daily allowance of provisions when necessity shall require it, taking due care that each man has credit for his deficiency, that he may be paid for the same.

6. No officer is to have whole allowance while the company is at short.

7. Beef for the use of the navy is to be cut into 10 pound pieces, pork into 8 pounds, and every cask to have the contents thereof marked on the head, and the person's name by whom the same was furnished.

8. If there be a want of pork, the captain may order beef in the proportion established, to be given in lieu thereof, and vice versa.

9. One half gallon of water at least shall be allowed every man in foreign voyages, and such further quantity as shall be thought necessary on the home station, but on particular occasions the captain may shorten this allowance.

10. To prevent the buying of casks abroad, no casks are to be shipped which will want to be replaced by new ones before the vessel's return to the United States.

11. If any provisions slip out of the slings, or are damaged through carelessness, the captain is to charge their value against the wages of the offender.

12. Every ship is to be provided with a seine, and the crew supplied with fresh provisions as it can conveniently be done.

Boatswain.

1. When a ship of the United States is commissioned, the boatswain is to exert himself to get on board all the stores committed to his charge as expeditiously as possible; he is to examine them very carefully, and to inspect very minutely all rigging fitted in the dockyard, and to report to the captain such defects as he may discover in them.

2. When fitting out the ship, and at all other times when it may be necessary to cut out rigging, he is to be extremely careful to cut every rope of the precise length allowed by the establishment unless some particular circumstance appertaining to the ship shall make it necessary to alter it, in which case he is to inform the captain and to receive his orders for such alteration.

3. He is, once at least every day, to examine the state of the rigging, to discover as soon as possible any part which may be chafed, or likely to give way, that it may be repaired without loss of time; he is, at all times, to be very careful, that the anchors, booms, and boats be properly secured.

4. He is to be very particular in having ready at all times, a

sufficient number of mats, plats, knippers, points, and gaskets, that no delay may be experienced when they are wanted.

5. He is to be very attentive in observing, while junk is working up, that every part of it is converted to all such purposes as it can possibly be made applicable to.

6. He is to be very frequently upon deck, during the day, and at times, both by day and night, when any duty shall require all hands to be employed; he is, with his mates, to see that the men go quickly upon deck when called, and that when there, they perform their duty with alacrity, and without noise or confusion.

7. When the ship is preparing for battle he is to be very particular in seeing that every thing necessary for repairing the rigging is in its proper place, that the men stationed for that service may know where to find immediately whatever may be wanted.

8. When the ship is ordered to be paid off, he is to be very attentive to prevent any of the rigging being damaged or cut, and he is to see every part of it properly tallied and stopped together, before he returns it in stores.

Sailmaker.

1. The sailmaker is very carefully to examine the sails when they are received on board, and to inform the boatswain if he discover any defects in them, or any mistake in their number or dimensions; he is to examine carefully whether they are perfectly dry when they are put into the sail room, and if any part of them be damp, the first proper opportunity must be taken to dry them.

2. He is to be attentive to see all the sails properly tallied, and so disposed of in the sail rooms, as to enable him to find immediately any that may be wanted.

3. He is to inspect frequently the condition of the sails in the sail room, to see that they are not injured by leaks or vermin, and he is to report to the boatswain, whenever it shall be necessary to have them taken upon deck to be dried; he is to repair them whenever they require it, and to use his best endeavours to keep them always fit for service.

Carpenter.

1. When a ship of the United States is ordered to be commissioned, the carpenter is to inspect very minutely into the state of the masts and yards, as well as those which may be in store in the dock yard, as those on board, to ensure their being perfectly sound and in good order; he is also to examine every part of the hull, the magazine, store rooms, and cabins; and he is to report to the master shipwright at the port any defect which he may discover.

2. He is to make every possible exertion in getting his stores on board, and he is to be very particular in observing that they are all

perfectly good, and that he receives his full allowance of every article.

3. When the ship shall be at sea, he is, once at least every day, to examine into the state of the masts and yards, and to report to the officer of the watch when he discovers any of them to be sprung, or to be in any way defective.

4. In ships of two decks, he is frequently to examine the lower deck ports, to see that they are properly lined; and when they are barred in, he and his mates are frequently to see that they are properly secured.

5. He is to be particularly careful in keeping the pumps in good order, always having at hand whatever may be necessary to repair them.

6. He is to keep the boats, ladders, and gratings, in as good condition as possible, always repairing every damage they may sustain as soon as he discovers it, that when the ship shall return into port, the workmen of the dock yard may have only the material defects of the ship to repair.

7. He is to keep always ready for immediate use, shot plugs, and every other article necessary for stopping shot holes, and repairing other damages in battle; and during the action, he is, with the part of his crew appointed to assist him, to be continually going about the wings and passages, and the hold, to discover where shot may have passed through, that he may plug up the holes, and stop the leaks as expeditiously as possible.

8. If he should at any time find stores or any other articles stowed in the wings or passages, in such a manner as might interfere with his working if required to cut out shot or stop leaks during an action, he is to report it to the captain that they may be removed.

9. When the ship is going into port, he is to prepare as correct an account as possible of the defects of the hull, masts, and yards, and of the repairs she may stand in need of, of which he is to deliver to the captain two copies, one of which, when signed by the captain, he is to deliver to the master shipwright of the dock yard. In making this report, he is to be very careful not to exaggerate any defect, by which there may appear to be a greater necessity for the ship being repaired than really exists, nor is he to conceal any which may require to be repaired.

10. He is to be particularly attentive in observing the exertions and examining the works of artificers sent from other ships to assist in repairing the ship he belongs to, and he is to report to the captain, when he discovers any, who, by their want of skill, or want of diligence, shall appear to be undeserving of the additional wages appointed to be paid them.

11. Whenever the ship shall be, for any purpose, ordered to be heeled, he is to see that all the pumps are in good order, and ready to be worked; he is to station one of his mates to observe, by sounding the well, whether any material increase of water is oc-

casioned ; he is to attend to this frequently himself, and to observe also whether there be any extraordinary appearance of water in the hold ; and in two deck ships, he is to be particularly attentive in seeing that the lower deck ports are well secured.

The following rules and regulations* are prescribed by congress for the government of the navy of the United States.

Art. 1. The commanders of all ships and vessels of war, belonging to the navy, are strictly enjoined and required to show, in themselves, a good example of virtue, honour, patriotism, and subordination ; and be vigilant in inspecting the conduct of all such as are placed under their command ; and to guard against, and suppress, all dissolute and immoral practices, and to correct all such as are guilty of them, according to the usage of the sea service.

2. The commander of all ships and vessels in the navy, having chaplains on board, shall take care that divine service be performed in a solemn, orderly, and reverend manner, twice a day, and a sermon preached on Sunday, unless bad weather, or other extraordinary accidents prevent it ; and that they cause all, or as many of the ship's company as can be spared from duty, to attend at every performance of the worship of Almighty God.

3. Any officer, or other person, in the navy, who shall be guilty of oppression, cruelty, fraud, profane swearing, drunkenness, or any other scandalous conduct, tending to the destruction of good morals, shall, if an officer, be cashiered, or suffer such other punishment as a court martial shall adjudge : if a private, he shall be put in irons, or flogged, at the discretion of the captain, not exceeding twelve lashes ; but if the offence require severer punishment, he shall be tried by a court martial, and suffer such punishment as said court shall inflict.

4. Every commander, or other officer, who shall, upon signal for battle, or on the probability of an engagement, neglect to clear his ship for action, or shall not use his utmost exertions to bring his ship to battle, or shall fail to encourage, in his own person, his inferior officers and men to fight courageously, such offender shall suffer death, or such other punishment as a court martial shall adjudge ; or any officer neglecting, on sight of any vessel or vessels of an enemy, to clear his ship for action, shall suffer such punishment as a court martial shall adjudge : And if any person in the navy shall treacherously yield, or pusillanimously cry for quarters, he shall suffer death, on conviction thereof, by a general court martial.

5. Every officer or private who shall not properly observe the orders of his commanding officer, or shall not use his utmost exertions to carry them into execution, when ordered to prepare for

* Act of 23d April, 1800.

join in, or when actually engaged in, battle; or shall, at such time, basely desert his duty or station, either then or while in sight of an enemy, or shall induce others to do so, every person so offending shall, on conviction thereof by a general court martial, suffer death, or such other punishment as the said court shall adjudge.

6. Every officer or private, who shall, through cowardice, negligence, or disaffection, in time of action withdraw from, or keep out of battle, or shall not do his utmost to take or destroy every vessel which it is his duty to encounter, or shall not do his utmost endeavour to afford relief to ships belonging to the United States, every such offender shall, on conviction thereof by a general court martial, suffer death, or such other punishment as the said court shall adjudge.

7. The commanding officer of every ship or vessel in the navy, who shall capture or seize upon any vessel as a prize, shall carefully preserve all the papers and writings found on board, and transmit the whole of the originals, unmutilated, to the judge of the district to which such prize is ordered to proceed, and shall transmit to the navy department and to the agent appointed to pay the prize money, complete lists of the officers and men entitled to a share of the capture, inserting therein the quality of every person, rating, on pain of forfeiting his whole share of the prize money resulting from such capture, and suffering such further punishment as a court martial shall adjudge.

8. No person in the navy shall take out of a prize or vessel seized as prize, any money, plate, goods, or any part of her rigging, unless it be for the better preservation thereof, or absolutely necessary for the use of any of the vessels of the United States, before the same shall be adjudged lawful prize by a competent court; but the whole, without fraud, concealment or embezzlement shall be brought in, and judgment passed thereon, upon pain that every person offending herein shall forfeit his share of the capture, and suffer such further punishment as a court martial, or the court of admiralty in which the prize is adjudged, shall impose.

9. No person in the navy shall strip off their clothes, or pillage, or in any manner maltreat persons taken on board a prize, on pain of such punishment as a court martial shall adjudge.

10. No person in the navy shall give, hold, or entertain any intercourse or intelligence to or with any enemy or rebel, without leave of the President of the United States, the secretary of the navy, the commander in chief of the fleet, or the commander of a squadron; or, in case of a vessel acting singly, from his commanding officer, on pain of death, or such other punishment as a court martial shall adjudge.

11. If any letter or message, from an enemy or rebel, be conveyed to any officer or private of the navy, and he shall not, within twelve hours, make the same known, having opportunity so to do, to his superior or commanding officer, or if any officer commanding a ship or vessel, being acquainted therewith, shall not,

with all convenient speed, reveal the same to the commander in chief of the fleet, commander of a squadron, or other proper officer whose duty it may be to take cognizance thereof, every such offender shall suffer death, or such other punishment as a court martial shall adjudge.

12. Spies, and all persons who shall come or be found in the capacity of spies, or who shall bring or deliver any seducing letter or message from an enemy or rebel, or endeavour to corrupt any person in the navy to betray his trust, shall suffer death, or such other punishment as a court martial shall adjudge.

13. If any person in the navy shall make, or attempt to make, any mutinous assembly, he shall, on conviction thereof by a court martial, suffer death; and if any person, as aforesaid, shall utter any seditious or mutinous words, or shall conceal or connive at any mutinous or seditious practices, or shall treat with contempt his superior, being in the execution of his office; or, being witness to any mutiny or sedition, shall not do his utmost to suppress it, he shall be punished at the discretion of a court martial.

14. No officer or private in the navy shall disobey the lawful orders of his superior officer, or strike him, or draw, or offer to draw, or raise any weapon against him, while in the execution of the duties of his office, on pain of death, or such other punishment as a court martial shall inflict.

15. No person in the navy shall quarrel with any other person in the navy, nor use provoking or reproachful words, gestures, or menaces, on pain of such punishment as a court martial shall adjudge.

16. If any person in the navy shall desert to an enemy, or rebel, he shall suffer death.

17. If any person in the navy shall desert, or shall entice others to desert, he shall suffer death, or such other punishment as a court martial shall adjudge; and if any officer or other person belonging to the navy, shall receive or entertain any deserter from any other vessel of the navy, knowing him to be such, and shall not, with all convenient speed, give notice of such deserter to the commander of the vessel to which he belongs, or to the commander in chief, or to the commander of the squadron, he shall, on conviction thereof, be cashiered, or be punished at the discretion of a court martial. All offences committed by persons belonging to the navy, while on shore, shall be punished in the same manner as if they had been committed at sea.

18. If any person in the navy shall knowingly make or sign, or shall aid, abet, direct, or procure the making or signing of any false muster, he shall execute, or attempt, or countenance, any fraud against the United States, he shall, on conviction, be cashiered and rendered for ever incapable of any future employment in the service of the United States, and shall forfeit all the pay and subsistence due him, and suffer such other punishment as a court martial shall inflict.

19. If any officer or other person in the navy shall, through inattention, negligence, or any other fault, suffer any vessel of the navy to be stranded, or run upon rocks or shoals, or hazarded, he shall suffer such punishment as a court martial shall adjudge.

20. If any person in the navy shall sleep upon his watch, or negligently perform the duty assigned him, or leave his station before regularly relieved, he shall suffer death, or such other punishment as a court martial shall adjudge; or, if the offender be a private, he may, at the discretion of the captain, be put in irons, or flogged, not exceeding twelve lashes.

21. The crime of murder, when committed by any officer, seaman, or marine, belonging to any public ship or vessel of the United States, without the territorial jurisdiction of the same, may be punished with death, by the sentence of a court martial.

22. The officers and privates of every ship or vessel, appointed as convoy to merchant or other vessels, shall diligently and faithfully discharge the duties of their appointment, nor shall they demand or exact any compensation for their services, nor maltreat any of the officers or crews of such merchant or other vessels, on pain of making such reparation as a court of admiralty may award, and of suffering such further punishment as a court martial shall adjudge.

23. If any commander, or other officer, shall receive, or permit to be received, on board his vessel, any goods or merchandise, other than for the sole use of his vessel, except gold, silver, or jewels, and except the goods or merchandise of vessels which may be in distress, or shipwrecked, or in imminent danger of being shipwrecked, in order to preserve them for their owner, without orders from the president of the United States or the navy department, he shall, on conviction thereof, be cashiered, and be incapacitated, for ever afterwards, for any place or office in the navy.

24 If any person in the navy shall waste, embezzle, or fraudulently buy, sell, or receive, any ammunition, provisions, or other public stores; or if any officer or other person shall, knowingly, permit, through design, negligence, or inattention, any such waste, embezzlement, sale, or receipt, every such person shall forfeit all the pay and subsistence then due him, and suffer such further punishment as a court martial shall direct.

25. If any person in the navy shall unlawfully set fire to, or burn, any kind of public property, not then in the possession of an enemy, pirate, or rebel, he shall suffer death: and if any person shall, in any other manner, destroy such property, or shall not use his best exertions to prevent the destruction thereof by others, he shall be punished at the discretion of a court martial.

26. Any theft, not exceeding twenty dollars, may be punished at the discretion of the captain, and above that sum, as a court martial shall direct.

27. If any person in the navy shall, when on shore, plunder, abuse, or maltreat any inhabitant, or injure his property in any way, he shall suffer such punishment as a court martial shall adjudge.

28. Every person in the navy shall use his utmost exertions to detect, apprehend, and bring to punishment all offenders, and shall, at all times, aid and assist all persons appointed for this purpose, on pain of such punishment as a court martial shall adjudge.

29. Each commanding officer shall, whenever a seaman enters on board, cause an accurate entry to be made in the ship's books of his name, time, and term of his service; and, before sailing, transmit to the secretary of the navy a complete list or muster roll of the officers and men under his command, with the date of their entering, time and terms of their service, annexed; and shall cause similar lists to be made out on the first day of every second month, to be transmitted to the secretary of the navy, as opportunities shall occur; accounting, in such lists or muster rolls, for any casualties which may have taken place since the last list or muster roll. He shall cause to be accurately minuted on the ship's books the names of, and times at which any death or desertion may occur; and in case of death, shall take care that the purser secures all the property of the deceased for the benefit of his legal representative or representatives. He shall cause frequent inspections to be made into the condition of the provisions, and use every precaution for its preservation. He shall, whenever he orders officers and men to take charge of a prize, and proceed to the United States, and whenever officers or men are sent from his ship, for whatever cause, take care that each man be furnished with a complete statement of his account, specifying the date of his enlistment, and the period and terms of his service; which account shall be signed by the commanding officer and purser. He shall cause the rules for the government of the navy to be hung up in some public part of the ship, and read once a month to his ship's company. He shall cause a convenient place to be set apart for sick or disabled men, to which he shall have them removed, with their hammocks and bedding, when the surgeon shall so advise, and shall direct that some of the crew attend them and keep the place clean; and, if necessary, shall direct that cradles and buckets with covers be made for their use. And when his crew is finally paid off, he shall attend in person or appoint a proper officer to see that justice be done to the men, and to the United States, in the settlement of the accounts. Any commanding officer offending herein, shall be punished at the discretion of a court martial.

30. No commanding officer shall, of his own authority, discharge a commissioned or warrant officer, nor strike, nor punish him, otherwise than by suspension or confinement, nor shall he of his own authority, inflict a punishment on any private beyond twelve lashes with a cat-of-nine-tails, nor shall he suffer any wired, or other than a plain cat-of-nine-tails to be used on board his ship; nor shall

any officer who may command by accident, or in the absence of the commanding officer (except such commander be absent for a time by leave) order or inflict any other punishment than confinement, for which he shall account on the return of such absent commanding officer. Nor shall any commanding officer receive on board any petty officers or men turned over from any other vessel to him, unless each of such officers and men produce to him an account signed by the captain and purser of the vessel from which they came, specifying the date of such officer's or man's entry, the period and terms of service, the sums paid, and the balance due him, and the quality in which he was rated on board such ship. Nor shall any commanding officer, having received any petty officer or man as aforesaid, rate him in a lower or worse station than that in which he formerly served. Any commanding officer offending herein, shall be punished at the discretion of a court martial.

31. Any master at arms, or other person of whom the duty of master at arms is required, who shall refuse to receive such prisoners as shall be committed to his charge, or, having received them, shall suffer them to escape, or dismiss them without orders from proper authority, shall suffer in such prisoners' stead, or be punished otherwise, at the discretion of a court martial.

32. All crimes committed by persons belonging to the navy, which are not specified in the foregoing articles, shall be punished according to the laws and customs in such cases at sea.

33. All officers not holding commissions or warrants, or who are not entitled to them, except such as are temporarily appointed to the duties of a commissioned or warrant officer, are deemed petty officers.

34. Any person entitled to wages or prize money, may have the same paid to his assignee, provided the assignment be attested by the captain and purser: and in case of the assignment of wages, the power shall specify the precise time they commence. But the commander of every vessel is required to discourage his crew from selling any part of their wages or prize money, and never to attest any power of attorney until he is satisfied that the same is not granted in consideration of money given for the purchase of wages or prize money.

35. General courts martial may be convened as often as the president of the United States, the secretary of the navy, or the commander in chief of the fleet, or commander of a squadron, while acting out of the United States, shall deem it necessary: But no general court martial shall consist of more than thirteen, nor less than five members; and as many officers shall be summoned on every such court as can be convened without injury to the service, so as not to exceed thirteen, and the senior officer shall always preside, the others ranking agreeably to the date of their commissions; and in no case, where it can be avoided with-

out injury to the service, shall more than one half the members, exclusive of the president, be junior to the officer to be tried.

36. Each member of the court, before proceeding to trial, shall take the following oath or affirmation, which the judge advocate, or person officiating as such, is hereby authorized to administer.

"I, A B, do swear or affirm that I will truly try, without prejudice or partiality, the case now depending, according to the evidence which shall come before the court, the rules for the government of the navy, and my own conscience, and that I will not by any means divulge or disclose the sentence of the court, until it shall have been approved by the proper authority; nor will I, at any time, divulge or disclose the vote or opinion of any particular member of the court, unless required so to do before a court of justice, in due course of law."

This oath or affirmation being duly administered, the president is authorized and required to administer the following oath or affirmation to the judge advocate, or person officiating as such.

"I, A B, do swear (or affirm) that I will keep a true record of the evidence given to, and the proceedings of, this court; nor will I divulge, or by any means disclose, the sentence of the court, until it shall have been approved by the proper authority; nor will I, at any time, divulge or disclose the vote or opinion of any particular member of the court, unless required so to do before a court of justice, in due course of law."

37. All testimony given to a general court martial shall be on oath or affirmation, which the president of the court is hereby authorized to administer; and if any person shall refuse to give his evidence as aforesaid, or shall prevaricate, or shall behave with contempt to the court, it shall and may be lawful for the court to imprison such offender, at their discretion: but the imprisonment in no case shall exceed two months. And every person who shall commit wilful perjury, on examination on oath or affirmation before such court, or who shall corruptly procure, or suborn, any person to commit such wilful perjury, shall and may be prosecuted by indictment or information in any court of justice of the United States, and shall suffer such penalties as are authorized by the laws of the United States in cases of perjury, or the subornation thereof. And in every prosecution for perjury, or the subornation thereof, under this act, it shall be sufficient to set forth the offence charged on the defendant, without setting forth the authority by which the court was held, or the particular matters brought, or intended to be brought, before the said court.

28. All charges, on which an application for a general court martial is founded, shall be exhibited in writing, to the proper officer, and the person demanding the court shall take care that the person accused be furnished with a true copy of the charges, with the specifications, at the time he is put under arrest, nor shall any other charge or charges than those so exhibited, be

urged against the person to be tried before the court, unless it appear to the court that intelligence of such charge had not reached the person demanding the court, when the person so to be tried was put under arrest, or that some witness material to the support of such charge, who was at that time absent, can be produced ; in which case, reasonable time shall be given to the person to be tried to make his defence against such new charge. Every officer so arrested is to deliver up his sword to his commanding officer, and to confine himself to the limits assigned him, under pain of dismission from service.

39. When the proceedings of any general court martial shall have commenced, they shall not be suspended or delayed on account of the absence of any of the members, provided five or more be assembled ; but the court is enjoined to sit from day to day, Sundays excepted, until sentence be given : And no member of said court shall, after the proceedings are begun, absent himself therefrom, unless in case of sickness, or orders to go on duty from a superior officer, on pain of being cashiered.

40. Whenever a court martial shall sentence any officer to be suspended, the court shall have power to suspend his pay and emoluments for the whole, or any part, of the time of his suspension.

41. All sentences of courts martial, which shall extend to the loss of life, shall require the concurrence of two-thirds of the members present ; and no such sentence shall be carried into execution, until confirmed by the president of the United States ; or if the trial take place out of the United States, until it be confirmed by the commander of the fleet or squadron : All other sentences may be determined by a majority of votes, and carried into execution on confirmation of the commander of the fleet, or officer ordering the court, except such as go to the dismission of a commissioned or warrant officer, which are first to be approved by the president of the United States.

A court martial shall not, for any one offence not capital, inflict a punishment beyond one hundred lashes.

42. The president of the United States, or, when the trial takes place out of the United States, the commander of the fleet or squadron, shall possess full power to pardon any offence committed against these articles, after conviction, or to mitigate the punishment decreed by a court martial.

45. Courts of inquiry may be ordered by the president of the United States, the secretary of the navy, or the commander of a fleet or squadron : But such courts shall not consist of more than three members who shall be commissioned officers, and a judge-advocate, or person to do duty as such ; and such courts shall have power to summon witnesses, administer oaths, and punish contempt, in the same manner as courts martial. But such court shall merely state facts, and not give their opinion, unless expressly required so to do in the order for convening ; and the

party, whose conduct shall be the subject of inquiry, shall have permission to cross-examine all the witnesses.

The proceedings of courts of inquiry shall be authenticated by the signature of the president of the court and judge-advocate, and shall, in all cases not capital, or extending to the dismission of a commissioned or warrant officer, be evidence before a court martial, provided oral testimony cannot be obtained.

The judge-advocate, or person officiating as such, shall administer to the members the following oath or affirmation.

"You do swear, (or affirm,) well and truly to examine and inquire, according to the evidence, into the matter now before you, without partiality or prejudice."

After which, the president shall administar to the judge-advocate, or person officiating as such, the following oath or affirmation.

"You do swear, (or affirm,) truly to record the proceedings of this court, and the evidence to be given in the case in hearing."

46. In all cases where the crews of the ships or vessels of the United States shall be separated from their vessels, by the latter being wrecked, lost, or destroyed, all the command, power, and authority, given to the officers of such ships or vessels, shall remain, and be in full force, as effectually as if such ship or vessel were not so wrecked, lost, or destroyed, until such ship's company be regularly discharged from, or ordered again into, the service, or until a court martial shall be held to inquire into the loss of such ship or vessel; and if, by the sentence of such court, or other satisfactory evidence, it shall appear that all, or any, of the officers and men of such ship's company did their utmost to preserve her, and, after the loss thereof behaved themselves agreeably to the discipline of the navy, then the pay and emoluments of such officers and men, or such of them as shall have done their duty as aforesaid, shall go on until their discharge or death; and every officer or private who shall, after the loss of such vessel, act contrary to the discipline of the navy, shall be punished, at the discretion of a court martial, in the same manner as if such vessel had not been so lost.

47. All the pay and emoluments of such officers and men, of any of the ships or vessels of the United States taken by an enemy, who shall appear by the sentence of a court martial, or otherwise, to have done their utmost to preserve and defend their ship or vessel, and after the taking thereof, have behaved themselves obediently to their superiors, agreeably to the discipline of the navy, shall go on and be paid them until their death, exchange, or discharge.

48. The proceeds of all ships and vessels, and the goods taken on board of them, which shall be adjudged good prize, shall, when of equal or superior force to the vessel or vessels making the capture, be the sole property of the captors; and when of inferior

force, shall be divided, equally, between the United States and the officers and men making the capture.

49. Prize-money, belonging to the officers and men, shall be distributed in the following manner.

1. To the commanding officers of fleets, squadrons, or single ships, three-twentieths, of which the commanding officer of the fleet or squadron shall have one-twentieth, if the prize be taken by a ship or vessel acting under his command; and the commander of single ships, two-twentieths; but where the prize is taken by a ship acting independently of such superior officer, the three-twentieths shall belong to her commander.

2. To sea-lieutenants, captains of marines, and sailing masters, two-twentieths; but where there is a captain, without a lieutenant of marines, these officers shall be entitled to two-twentieths and one-third of a twentieth, which third, in such case, shall be deducted from the share of the officers mentioned in article No. 3 of this section.

3. To chaplains, lieutenants of marines, surgeons, pursers, boatswains, gunners, carpenters, and master's mates, two-twentieths.

4. To midshipmen, surgeon's mates, captain's clerks, schoolmasters, boatswain's mates, gunner's mates, carpenter's mates, ship's stewards, sailmakers, masters at arms, armorers, cockswains, and coopers, three-twentieths and a half.

5. To gunner's yeomen, boatswain's yeomen, quarter-masters, quarter-gunners, sailmaker's mates, sergeants and corporals of marines, drummers, fifers, and extra petty officers, two-twentieths and a half.

6. To seamen, ordinary seamen, marines, and all other persons doing duty on board, seven-twentieths.

7. Whenever one or more public ships or vessels are in sight at the time any one or more ships are taking a prize or prizes, they shall all share equally in the prize or prizes, according to the number of men and guns on board each ship in sight.

No commander of a fleet or squadron shall be entitled to receive any share of prizes taken by vessels not under his immediate command; nor of such prizes as may have been taken by ships or vessels intended to be placed under his command, before they have acted under his immediate orders; nor shall a commander of a fleet or squadron, leaving the station where he had the command, have any share in the prizes taken by ships left on such station, after he has gone out of the limits of his said command.

50. A bounty shall be paid by the United States, of twenty dollars for each person on board any ship of an enemy at the commencement of an engagement, which shall be sunk or destroyed by any ship or vessel belonging to the United States of equal or inferior force, the same to be divided among the officers and crew in the same manner as prize money.

* The navy ration shall consist of as follows: On Sunday, fourteen ounces of bread, one and a quarter pound of beef, half a pound of flour, one quarter of a pound of suet, one half pint of distilled spirits; Monday, fourteen ounces of bread, one pound of pork, half pint of peas, one half pint of distilled spirits; Tuesday, fourteen ounces of bread, one pound of beef, two ounces of cheese, one half pint of distilled spirits; Wednesday, fourteen ounces of bread, one pound of pork, half pint of rice, one half pint of distilled spirits; Thursday, fourteen ounces of bread, one and a quarter pound of beef, half pound of flour, quarter pound of suet, one half pint of distilled spirits; Friday, fourteen ounces of bread, four ounces of cheese, two ounces of butter, half pint of rice, half pint of molasses, one half pint of distilled spirits; Saturday, fourteen ounces of bread, one pound of pork, half pint of peas, half pint vinegar, one half pint of distilled spirits.

† All the vessels in the service of the United States, mounting twenty guns and upwards, shall be commanded by captains; those not exceeding eighteen guns, (except galleys, which are to be commanded as heretofore provided by law,) by masters or lieutenants, according to the size of the vessel, to be regulated by the president of the United States.

The pay of captains commanding ships of thirty-two guns and upwards, shall be one hundred dollars per month, and eight rations per day; of captains commanding ships of twenty and under thirty-two guns, seventy-five dollars per month, and six rations per day; of a master commandant, sixty dollars per month, and five rations per day; and of lieutenants, who may command the smaller vessels, fifty dollars per month, and four rations per day.

‡ The pay and subsistence of the respective commissioned and warrant officers shall be as follows: a lieutenant, other than a master commandant, or lieutenant commanding small vessel, forty dollars per month and three rations per day; a chaplain, forty dollars per month and two rations per day; a schoolmaster, twenty-five dollars per month and two rations per day; a sailing-master, forty dollars per month and two rations per day; a surgeon, fifty dollars per month and two rations per day; a surgeon's mate, thirty dollars per month and two rations per day; a purser, forty dollars per month and two rations per day; a boatswain, twenty dollars per month and two rations per day; a gunner, twenty dollars per month and two rations per day; a sailmaker, twenty dollars per month and two rations per day; and the pay to be allowed to the petty officers and midshipmen, and the pay and bounty upon enlistment of the seamen, ordinary seamen, and marines, shall be fixed by the president of the United States:

* Act of 3d March, 1801. † Act of 25th February, 1799.
‡ Act of 18th April, 1814.

But the whole sum to be given for the whole pay aforesaid, and for the pay of officers, and the amount of bounties upon enlistment of seamen and marines, shall not exceed, for any year, the amount which may, in such year, be appropriated for those purposes respectively.

* The pursers in the navy of the United States shall be appointed by the president of the United States, by and with the advice and consent of the senate ; no person shall act in the character of purser, who shall not have thus been first nominated and appointed. And every purser, before entering upon the duties of his office, shall give bond with two or more sufficient sureties, in the penalty of twenty-five thousand dollars, conditioned faithfully to perform all the duties of purser in the navy of the United States.

† Whenever any officer shall be employed in the command of a squadron, on separate service, the allowance of rations to such commanding officer shall be doubled during the continuance of such command, and no longer, except in the case of the commanding officer of the navy, whose allowance, while in the service, shall always be at the rate of sixteen rations per day.

The president of the United States is hereby authorized to place on the naval establishment, and employ accordingly, all or any of the vessels which, as revenue cutters, have been increased in force, and employed in the defence of the seacoast, pursuant to the act entitled "An act providing a naval armament ;" and thereupon the officers and crews of such vessels may be allowed, at the discretion of the president of the United States, the pay, subsistence, advantages, and compensations, proportionably to the rates of such vessels, and shall be governed by the rules and discipline which are, or which shall be, established for the navy of the United States.

By an act passed March 3, 1819, ships of the first class are to be called after the states of the Union ; those of the second class, after the rivers ; and those of the third class, after the principal cities and towns, taking care not to call two vessels after the same name.

The flag of the United States consists of *thirteen* horizontal stripes, alternate red and white, and the Union is twenty-four white stars, in a blue field. On the admission of every new state into the Union, a star is to be added to the union of the flag on the next fourth of July to such admission.

* Act of 30th March, 1812. † Act of 25th February, 1799

FULL AND HALF PAY RATIONS.

1. The full pay and full rations of all commission and warrant officers shall commence from the date of their acknowledgment of the receipt of their orders for service, unless there should appear to have been unnecessary delay in their executing said orders, in which case the secretary of the navy will direct their pay to commence at the time of their joining the command, ship, or station, to which they may have been ordered.

2. The full pay and full rations of all commission and warrant officers shall cease, when they shall be notified by the secretary of the navy, that their active services are no longer required.

3. Officers thrown out of active employment by order of the secretary of the navy shall be entitled to only half their pay and half their rations.

4. The resignation of a half pay officer when called into active service, will be considered a disobedience of orders.

5. A lieutenant succeeding to the command of a ship, by the death of the captain, and any officer, properly qualified, who shall be appointed on any foreign station by the senior officer present to act in a station vacated by the death of the officer who held it, shall receive the pay allotted to that station, until another officer shall supersede him.

6. The pay of an officer who quits the ship he belonged to on any foreign station, whatever may be his reasons, shall cease from the time he quits her, unless the secretary of the navy shall be satisfied that his removal was absolutely necessary for the recovery of his health.

7. The half pay of officers who leave the United States on furlough for more than twelve months shall cease after that period; nor shall they again be entitled to it but by order of the secretary of the navy; and no officer, whatever may be his reasons, will be considered as belonging to the service, unless he report himself to the secretary of the navy once a year, if practicable for him to do so.

Marines serving on board the ships of the United States.

1. The marine detachments appointed to serve on board the ships of the United States, are to be entered upon their books, as part of the complement for victuals; and with regard to provisions and short allowance money, they are to be, in all respects, upon the same footing with the seamen.

2. When marines are wanted on board any ship or vessel, the commanding sea officer at the port where such ship or vessel shall be, is to give as early notice as possible of the number wanted, to the commanding marine officer on shore.

3. The commissioned and noncommissioned officers are to go on board with the men, and reside there constantly with them at their duty.

4. All marine officers are to obey the orders of the captain or commanding officer of the ship, and also of the commanding officer of the watch. The marine officers are, upon all occasions, to be treated, as well by the captain of the ship as by all other officers and people belonging to her, with the respect, decency, and regard due to the commissions they bear. They are to possess the cabins or births erected for them.

5. The marines are to be exercised by the marine officers in the use of their arms, as often as possible, that they may become expert in the use thereof. They are to be employed as sentinels, and upon all other duties and service on board the ship which they may be capable of, and therein to be subject to the directions of the officers of the ship; but they are not to be obliged to go aloft, or to be punished for not showing an inclination to do so. And the captain or commanding officer of the ship is strictly charged not to suffer them to be ill treated, nor a sergeant or corporal to be struck on any account, by any of the officers, petty officers, or seamen.

6. No marine, serving on board any of the United States' vessels of war, is to be discharged as such, and entered as a seaman, without special authority from the secretary of the navy.

7. When any marines shall be sent upon duty, either on board of any other ship or on shore, they are not to be discharged from the books of the ship from which they shall be sent, while such ship shall remain in port, and not have the established number completed with other marines.

8. The commanding marine officer is to have in his possession, the chests prepared for the arms and the cartridges for the use of the marines. The arms and drums are to be under his charge, and he is to be accountable for any loss or damage that may happen for want of sufficient care in him; but if any such loss or damage happen by the default of any other person, the marine officer is immediately to acquaint the captain of the ship therewith, who is to cause the value thereof, to be forthwith noted against the defaulter's name in order to its being deducted from his pay or wages.

9. The marine arms are to be kept clean and in good condition by the marines themselves, so far as they can do the same; but if necessary, the marine officer may apply to the captain for the assistance of one or more armorer's mates, to repair the arms; and the captain, in such case, will order such assistance to be afforded.

10. When marines are sent on board of any of the United States' ships, in order to serve at sea, the captain of the ship is to cause the purser to supply them, upon their coming on board, with a suit of bedding, if necessary, and from time to time, with such further bedding and slop clothes, &c. as the commanding marine officer may represent them to be in want of; for all which, the officer, charged with paying the marines, shall settle with the pur-

ser of the ship, charging the amount thereof to the accounts of the marines to whom such bedding and slops have been so issued.

11. The commanding marine officer on board must examine, once a week, at least, into the state of the clothing and slops belonging to each marine, and if he finds any loss or abuse, must inquire how it happened, and he is to inform the captain of the ship of the circumstances, who will apply such corrective as may be necessary to prevent the recurrence of such losses or abuses.

12. When any marine, belonging to the ship, dies, his clothing and effects (except his uniform marine clothing) are to be sold at the mast by auction, and the produce charged against the names of the buyers; and the marine officer will, by the first opportunity, transmit to the paymaster of the marine corps, an inventory of the effects so sold, and an account of the money or amount for which they sold, signed by the captain and purser of the ship, in order that such amount may be paid over to the legal representatives of the deceased.

13. A store room, on board of each ship to be in the possession of the marine officer, is to be appropriated exclusively for the spare clothing, accoutrements, and all other necessaries for the use of the marines.

14. Marines, sick or wounded, are to be taken the same care of by the surgeon of the ship that the seamen are; and when it shall be necessary to send them out of the ship for cure, they are to be sent on shore to the hospital, or sick quarters, and are to be in all respects under the same regulations that are established for the seamen; sick tickets are to be sent with them, similar to those to be sent with the seamen. The captain of the ship and the commanding marine officer on board, are to see that their bedding, clothes, and necessaries, are sent along with them, the particulars of which are to be noted at the foot of the sick tickets. The commanding marine officer will see that each man's things be securely bound together and labelled. The proper officer at the hospital or sick quarters, and the marine officer attending hospital duty, (where there shall be any,) are to take care that the same be safely deposited and preserved till the marines are either discharged, run, or die. If discharged, they are to be delivered to their respective owners, and in the cases of desertion and death, they are to be disposed of as provided in the case of dead men's clothes on board of ship.

15. Marines sent sick on shore are to be continued upon the books of the ship, from which they shall be sent, unless the proportion of marines allowed the ship be completed during his sickness; and in the latter case, they are, when recovered, to be turned over to some other ship wanting marines, or to be sent to the nearest marine station. So soon as the number allowed the ship be completed, all marines sent sick on shore, are to be discharged from the ship's books, as the ship must never be charged with more than the complement of marines allowed her.

16. When a marine is returned on ship board from an hospital or sick quarters, the captain of the ship is to take care that there be charged against his name the value of any clothing he may have been supplied with at the hospital, which the hospital surgeon is to set off upon the ticket of discharge from the hospital.

17. The rations issued to the marines must be charged by the purser to the subsistence of the marine corps, in order that the subsistence of the navy may have credit therefor, in the settlement of his accounts.

18. Marines are to be paid by the purser of the ship, while they are on board of ship, and charged the same as the ship's crew. Pay rolls, signed by the purser, and countersigned by the marine officer, are to be regularly transmitted to the fourth auditor of the treasury.

RULES AND REGULATIONS IN HARBOUR.

When the general and respective orders are issued, each lieutenant will take a copy of them, and sign his name in the orderly book as an acknowledgment of the same.

The officers are considered always to be answerable for their respective watches. All boats, on their return on board, are to be reported to the first lieutenant and the officer of the watch.

The boat-keeper of the day has charge of the boat's furniture, and will keep her clean and in good order.

On coming alongside he will either haul her out to the guess-warp, or veer her astern.

The officer and coxswains of the boats are particularly ordered never to bring liquor of any kind on board of the ship without permission from the first lieutenant; they are also to use their utmost exertions in preventing its being smuggled on board, as they are answerable for the conduct of their crews.

The officer of the morning watch will order a midshipman to call the first lieutenant at daylight, and have the boatswain and his mates ready for turning up all hands.

When the hands are turned up the people will muster on the quarter deck, answer to the roll and be then set to their respective duties.

At seven bells the hammocks will be piped up and the quarter masters will stow them, under the inspection of the midshipmen of the watch.

After the hammocks are stowed, the officer of the watch will have the decks swept down, the ropes hauled taut, fore and aft, the top-gallant yard ropes stretched along, and top-men sent to each mast head to overhaul their lifts and braces.

The officer of the morning watch will, immediately after the people have answered to the roll, order the boatswain to hoist out

and lower down the boats, and despatch them on any necessary service from the orders of the first lieutenant, after which he will wash decks, and, should the boats not be wanted, the respective boat-keepers of the day will clean them out.

If the weather permits, at ten minutes before eight in summer, and nine in winter, the hands will be turned up, " up topgallant yards !"—every man will repair to his station, and every officer is expected to attend upon deck. At the word sway across, the yards will be crossed, the bell struck, and the colours hoisted at the same time, after which, the yards will be squared, and the people go to breakfast ; but it is to be remembered, that if a commodore or a superior officer is in the harbour, this evolution will be followed from his motions.

The midshipman of the watch will report to the first lieutenant when the allotted time for the people's breakfast is expired, which is half an hour, when the hands will be turned up, and set to their respective duties.

When the hands are turned up, after breakfast, and set to their relative duties, one division will be left below to clean the 'tween decks, under the inspection of the officers of the morning watch, who will report the same to the first lieutenant, when finished.

The Surgeon and his assistants, will always visit and attend the sick, at ten o'clock, and present a written statement of their case to the 1st. lieutenant and captain ; his assistant will also place a sick list in the binnacle drawer, for the inspection of the officers of the watches, as no man on any account, will ever be excused from duty, without he has reported himself to the surgeon, and had his name inserted in this list.

The signal-men will be ordered to keep a strict look-out for the commodore's signals and motions.

The quarter-masters of the watch will attend to the swinging of the ship, and boats coming on board, reporting the same with the rank of the officer in her, to the officer of the watch, that he may order the side to be manned accordingly.

A boatswain's mate and the sides-men should always be near the gangways to attend the side when ordered.

A master-at-arms or ship's corporal is always to be on the gangway from morning until evening gun-fire, to prevent any desertion or nefarious practice being carried on by the boats.

The sentinels will be positively ordered, never to permit a shore-boat alongside, without the sanction of an officer of the watch.

The sailing-master will attend to the swinging of the ship, will endeavour to keep a clear hawse, and when necessary ask permission of the first lieutenant, either to clear hawse, or sight the anchor ; which duty he of course will immediately order to be completed.

When an officer of either rank leaves the ship to answer a signal, he will carry the order book with him to copy orders, and re-

port, and show the same to the first lieutenant, on his return on board.

When the commander or any captain either leaves, or comes on board of the ship, he will be received by a guard, and all the officers are expected to attend upon the quarter-deck.

When any of the keys of the store-rooms are wanted, they will be asked for on the quarter-deck, and fetched by a midshipman of the watch, to whom they will also be returned when done with: this rule will be observed both at sea and in harbour.

Three smart boys will be selected, and put into each watch: they are to stay on the quarter deck, to carry any of the officer's messages, and call the midshipmen when below, for any duty required. They should wear caps, with a winged mercury painted on them.

An orderly, besides the sentinel, will always be planted near the cabin-door, with side-arms only, to carry the captain's orders and messages.

The inferior officers will always walk the quarter-deck, on the side opposite to that occupied by their superiors, and as the quarter deck is considered as a parade, each officer will pay that respect, of removing his hat on coming on it. Every officer is expected to be in uniform when on the quarter-deck, nor is he ever to leave the ship on duty without side-arms.

The ship's steward will receive orders from the first lieutenant when to serve out provisions, as it well depend a great deal on the duty of the ship.

When a sloop, or lighter, &c. is cleared, she will be first inspected, before she leaves the ship, by a midshipman and a ship's corporal, to prevent any men deserting in her.

At seven bells, the day mate will get the spirits up, and mix the people's grog, the work will then be returned to its respective department, and the decks swept down. At noon the boatswain and his mates will be ordered to pipe to dinner.

After the people have had their time to dinner, which is one hour, the midshipman of the watch will report the same to the first lieutenant, when the hands will be turned up, and again set to their respective duties, and the 'tween decks swept down.

When the sweepers are wanted, they will be always piped for, and they are to be ordered always to discharge the dirt on the lee side of the head.

The mate of the main deck will attend to the duty on that deck, and see it kept clean, and the mate of the hold will do the same to the 'tween decks.

The captain of the head will see that the swabs are washed, and hung up in the head to dry, as soon as used.

At 4 o'clock the work will be made up, and returned, the grog mixed, and spirits struck down, the decks swept, and the people piped to supper.

At sunset the top-gallant yards will be sent down, the decks swept, the keys of the store rooms returned, and the hammocks piped down. The mess-mates of the men that are absent, will take their hammocks down, and hang them up.

Each midshipman has a man appointed to carry his hammock up and down, and make up his bed, who will, when circumstances will permit, receive the reward of a glass of grog.

After the hammocks are hung up, and their clothes made up, the boats will be hoisted in, and up to their davits, except the one appropriated for the accommodation of the officers.

The officers of the night watches will not after gun-fire permit any boats to pass without being hailed, or any boat whatever to come alongside, without permission from the first lieutenant.

On coming on to blow, in an open roadstead, or harbour, the top-gallant yards should be sent down, the boats hoisted in and well moored astern, fresh service clapped in the hawse, top-gallant yards laid on the booms, and mast ropes rove, anchors clear for letting go, a range of cable overhauled on deck, and the tiers clear for veering it out, ropes hauled taut, and every thing seen snug, for riding out the gale. If with a commodore, or superior officer, no evolution, such as sending down top-gallant yards, striking topmasts, &c. must be followed, without being ordered by him, either by signal or example.

Every evolution and manœuvre must be first sanctioned by the commodore's signals or motions.

Liberty of going on shore will be granted to the ship's company when the duty of the ship will permit, by sub-divisions, and the indulgence of having liquor on board, will be granted by messes; and any advantage taken, or breach of these indulgences, should be severely punished on the offenders, and no more granted, until the good conduct of the ship's company may induce the first lieutenant to renew them.

There should always be one lieutenant, one warrant officer, three midshipmen, one marine officer or sergeant, and the surgeon or his assistant, on board of the ship, to attend to the duty.

In the absence of the first lieutenant, the second will succeed to his functions, and carry on the duty of the ship.

Washing days will follow those for mustering by divisions, which should at least be twice a week, on which days the cook should be called at 4 o'clock in the morning, to boil the water for washing, and the hands at 6 o'clock will be turned up to wash clothes, and continue washing until half past nine or ten, when they will be hung on white-lines rove the night previous for that purpose, between the fore, main and mizen rigging; should it come on to rain before they are dry, they will be piped down, and placed in kids under the charge of the sentinel, at the cabin door, until an opportunity again offers to dry them; when perfectly dry they will be piped down, the stops cut off the lines, which will be unrove and returned to the boatswain's yeoman.

The wind sails are to be constantly kept down and trimmed, and the 'tween decks are to be frequently aired by swinging stoves appropriated for that purpose.

When duty is required of the men at the navy yard or on shore, a division or sub-division, as may be deemed adequate to such duty, will be sent to execute it.

Things found lying about the deck are to be put into the charge of the master-at-arms until their owners claim and describe their property.

Dead men's clothes are to be sold by auction at the mast to the highest bidder, and the sum deposited in the purser's hands, for the benefit of the deceased's relations, to whom a fair account of stoppages and wages due to the deceased, will be rendered by the purser the first opportunity.

Deserters' clothes will be sold also at the mast, by auction, and the sum thereof deposited in the purser's hands, to be appropriated to the fund for widows and orphans.

On receiving volunteers, or fresh men, on board, the first day is always allowed them for slinging their hammocks.

The mate of the hold should be careful, when working in the spirit room: nor should he ever allow, without permission from the first lieutenant, the captain of the hold to take the empty spirit casks, to make what they term a *bull*, which is done by putting water into them, and letting it remain until it partakes of the cask, which makes pretty strong grog, and is frequently the cause of much drunkenness.

The ship's company's lights are to be extinguished at eight o'clock, the midshipmen and warrant officers at nine, and the lieutenant's at ten, though an extension of time will be allowed to the officers when requested of the first lieutenant.

The master-at-arms will see that all lights are extinguished, and report the same, when done, to the first lieutenant.

RULES AND REGULATIONS FOR SEA.

Every officer is to have a respective list of the ship's company, that when required they can muster the people and prevent a neglect of duty.

On the setting of each watch, the mate will muster the people and report the absentees to the officer of the watch.

Look-outs will be placed on each bow, gangway, and quarter, who will keep a strict look-out for all strange sail, and sing out every half hour. They are to be inspected and regularly relieved by the directions of the officer of the watch.

The officer of the watch is neither to make or shorten sail without permission from the captain, unless a squall or other oc-

currences may render it necessary ; which, if material, is to be reported to the captain.

The officer of the watch will pay a strict attention to the steerage, nor alter the course without permission or necessity ; he will see that the course and distance are marked by the mate of the watch every half hour on the log-board, to which he will affix his signature at the end of the watch.

On seeing a strange sail in the night, he will immediately inform the captain of the circumstance.

If in company, or under a commodore, his bearing and distance will be inserted every half hour on the log-board.

No officer is to quit the deck on any pretence without being regularly relieved by the officers of the next watch.

On relieving the deck, the officer will receive the orders of the night, and be informed how many knots the ship went the last time the log was hove, what sail is set, what watch is on deck, the bearing of the commodore's light, with other particulars, previous to the officer he relieved leaving the deck.

Any change of weather or material circumstance will be reported to the captain.

The officer of the morning watch will commence washing decks at daylight, if the duty of the ship will permit ; he will then get the sails trimmed, topsail and top-gallant sheets hauled close home, tacks aboard, &c. and every thing prepared for making sail. The mast-head men will always be sent up at daylight, and be relieved every hour.

The mate of the watch will always call the first lieutenant at daylight.

The hammocks will be piped up at seven bells, and at eight the people will go to breakfast, if the duty of the ship will permit.

In tacking or wearing by watches, the idlers will be called to assist, as also on washing decks, unless they have been on particular duty during the night.

The boys are to be mustered aft on the quarter deck by the master-at-arms or ship's corporal at seven bells, and inspected by the officer of the watch or first lieutenant to see they are clean.

When the watch is called after breakfast, the officers of the morning watch will, with the watch below, clean the 'tween decks, and report the same to the first lieutenant when finished.

The purser's steward will at nine o'clock in the morning commence serving out provisions, and that by messes.

The ship's company will form themselves into messes of six men in each mess, and not less than four.

A master's mate, a quarter master, a captain of the forecastle, and a boatswain's mate, will always attend at the cutting up of beef and pork, to prevent any discontent of the ship's company.

Each mess will place their respective tallies on their beef, pork, puddings, &c. on putting them into the coppers, which will prevent all disputes. The ship's cook will take up the dinner at se-

ven bells, when the duty of the ship will permit the ship's company to go to dinner at twelve o'clock.

After dinner the cooks will clean the coppers out, select the cinders, and throw the ashes overboard; the master-at-arms will inspect the same, and report it when done to the first lieutenant.

The washing days will be the same as in harbour, and one afternoon in the week will be allowed the ship's company to mend their clothes.

Any man having a just cause of complaint, will come quietly aft and make the same to the officer of the watch, who will report it to the first lieutenant for investigation and redress; but all litigious and ungrounded complaints will be severely punished.

One hour before sun-set the hands will be piped to supper, after which the seamen and marines will be mustered at quarters, and every thing seen ready for action in the night; the hammocks will be then piped down, except in chase.

For shortening sail for the night, is from the captain's orders.

A midshipman of the watch calls the lieutenant of the next watch, and a quarter master calls the midshipmen.

When the hands are turned up on any service, the officers below are to be informed of it in the same manner.

On all hands being called for working ship, the people will repair to their respective stations, keep a strict silence, and obey their officer's orders.

Every commander expects that a mutual advantage, combined with a desire of doing their duty, will always induce the officers, seamen and marines, under his command, to execute their duty with cheerfulness, and pay a strict attention to the discipline and subordination of the ship.

On joining company with a commodore at sea.

When sufficiently near the commodore, or strange sail, make the private signal. If a salute be required, have irons* heated in the fire, and the guns loaded and primed. If on the contrary, the salute is by cheering, have the ship's company dressed, and show them their stations† in the rigging; make all possible sail to join company with despatch, take care that the hammocks are well stowed, that nothing is towing overboard, that the rigging is free from clothes, the sides and head well washed down, the half-ports off, the sheets close home, and sails well set. If the commodore's flag is of a different colour to that which the ship is under, she should be ready to change the ensign as soon as he has answered the salute. If the commodore is lying-to, continue the sail out till the ship is sufficiently near to be able to shorten it, before it is necessary to man the rigging, and to cheer in passing his ship. If the

* Irons are the most approved means of firing a salute.

† See the preceding instructions for coming to anchor, page 169.

commodore should not bring to, and it is requisite to send a boat on board, continue the sail till far enough ahead to be able to hoist a boat out before he can pass. Every ship, on joining a fleet or squadron, is more or less taken notice of, and her name is most likely to be stamped for the good or bad order which is seen to prevail; therefore the utmost pains should be taken to make her appearance as good as possible. It very frequently happens, that by not making proper allowance for the commodore's fore-reaching whilst lying-to under a main-topsail, that the ship which joins company brings-to too soon, and is obliged afterwards to make sail, or that the boat is a long time in rowing on board, which to those who are spectators, has a very ridiculous appearance.

OBSERVATIONS ON THE EQUIPMENT AND FITTING OUT OF A SHIP OF WAR FOR SEA.

The ready equipment of a ship just commissioned, will depend on her number of men; and, as despatch is generally the prevailing motive, a great deal of work in a short time is the general result, which proceeds from a praise-worthy zeal. But as a ship, on being first commissioned, requires so much adjustment for her permanent advantage, it appears better if the service will allow it, to devote a longer period than that usually taken for her equipment, which ultimately may not prove a loss of time. In time of war, seamen are sometimes so numerous that they are chosen from their size or abilities.

A master at arms, corporals, boatswain's mates, fifers and painters, being difficult to acquire, the executive officer should use every endeavour, while the ship is fitting, to procure them. They are most likely to be had from ships which are intended to be paid off. The two first classes of men are so essential to the future good order of the ship, that none ought to be received but such as produce a recommendation or certificate of their good behaviour from their last captain. The captain, when he has determined on the manner in which he chooses to have his ship rigged, stowed, and fitted, gives his directions to the executive officer, and will perceive that the duty proceeds in proportion to the number of men on board. As ships are, at first, most commonly rigged by contract, it will be impossible to lay down here any specific rule for that operation. The ground tier is generally first stowed, to give the ship stability, and the rigging completely fitted, that it may be stretched as much as possible, before the ship proceeds to sea. The executive officer must now calculate the number of men and make his arrangements accordingly; reserving that duty which may be performed under cover for rainy weather: such as making mats, points, robands and gasketts for two sets of sails: sinnets, spunyarn, &c.

The gunner must be allowed to have the greatest part of his crew with him on shore at the gun wharf, in order to prepare the tackle and breechings for the guns, by the time the ship is ready to receive them. The carpenter should get the boats fitted and painted; hammock cloths and tarpaulins nailed up and painted, that they may be perfectly dry by the time they are wanted.

The ship being rigged, the provisions on board, and all ready to proceed from moorings, the sea-stores may now be drawn, but not sooner, as they are intended only for the precise object signified by the name they bear, and might otherwise be frequently misused if the warrant officers were allowed to demand them. To reduce this point to a more intelligible signification, we shall proceed to state what is considered under the head of sea-stores, &c. viz. In the boatswain's charge there are stores of three denominations, first, present use store, which consists principally of tallow, twine, junk, spunyarn, &c. the second, called ship's furniture, comprehends all the ship's standing and running rigging, studding-sail-geer, preventer braces, and every equipment for sea, excepting top-gallant-sheets, which are not allowed in the rigging warrant, as double top-sail lifts are supposed to answer the purpose, by having them single, and appropriating the overplus of rope accordingly: but for large ships, which have double top-sail lifts, top-gallant-sheets are granted on demand.

The third denomination is sea-store, which includes all the sails, marling-spikes, commanders, mallets, spare ropes, &c. not rove for the above occasions. The frequent deficiency of stores has made us more particular on that account, as young officers, unacquainted with the nature of sea-stores, frequently suffer the boatswains to draw them at first, on some specious excuse, who then convert them to some purpose different from the use to which they ought solely to be appropriated. The consequence is embezzlement, and the want of them when at sea. Ships are allowed a sufficiency of almost every article, and their being short at any time, must proceed either from neglect or embezzlement. Be guarded, therefore, against both. At every conversion of stores the master should be present, and he should see the rigging cut out, of which all should be done at the same time, and at as short a period before going to sea as possible, that once getting it out of the store-room might be sufficient, and that by not having it rove whilst in harbour, the plunder of thieves, which infest every sea-port might be prevented. The ship having now her sea-store on board, and every thing ready for sea, let the executive officer look round and see every thing in its place as follows:

The spare top-masts, top-gallant masts, and top-sail and top-gallant yards fitted; all the spare sails ready for bending, the storm-stay-sail, haulyards, stays, and sheet-rove; the ship's company watched, quartered, and stationed; the stores and provisions completed; the three months advance paid previous to going to sea; the hammocks scrubbed, and linen washed, the lower yards slung:

the studding-sails bent, sheet anchor stowed, and the cable unbent, but at as short a period before going to sea as possible ; and in some cases it will be prudent not to unbend it until the ship is at sea. All the arm-chests and hen-coops cleated, the guns secured, a sufficient number of cartridges and powder-horns filled, the screens for the hatchways fitted.

As soon as at sea, the preventer braces should be rove, the lower yards, anchors, and gaff slung in chains ; slings for the top-sail yards in the tops, messenger unrove and coiled in the tier, buoy and buoy ropes off the anchors, toggels on the braces and bowline bridles ; all the lumber off the decks, casks of water lashed, and match-tubs distributed at the quarters.

In going to the East or West Indies, have boats, staunchions, and awnings fitted before the ship arrives ; and when going to a foreign port, have boats, pendant-staffs and pendants made. The ship's company should now be made perfect at their quarters and stations, both by day and night ; also in making sail, shortening sail, reefing top-sails, &c. for which purpose it appears proper to reef every night, and in the day time always to turn the hands up at performing every evolution that the ship's company may perfect themselves in their stations and acquire the method by which the duty is carried on. When the hands are on deck, every piece of duty should be performed in a regular, systematic manner. The lanterns should be always ready for the quarters, and the candle's ends matched in them, with painted bags to cover them ; a sufficient number of false fires on deck to make the private signal, and two matches always kept lighted during the night.

ON DISCIPLINE IN GENERAL.

Having treated on the different points most essentially requisite to be attended to by the captain of a ship of war, we shall now present a summary or abridgment, in which we would depict what ought to be the characteristic of his command. Let him fancy the movements of his ship to be those of a great machine, whose vigour, expertness, utility, and effect, are dependent on discipline, and discipline on himself. Let discipline then be considered as the great wheel which sets in motion numberless small ones ; the great cause of every success ; the vital spring of subordination : the commanding, invigorating principle of every action ; the power which rewards and protects ; whose advantages include all that is derived from the laws, authority and obedience, created with, and expiring only with his commission.

Let the health, ease, comfort, and happiness of those under his command be his domestic charge, reserving their strength for opportunities which will compensate his attention. A system clear and methodical ; the execution of it precise and regular. A friend

to good and deserving men, a terror to bad ones; the protector of the weak, and an impartial administrator to the whole. If we reflect on the number and description of men on board ship, we shall perceive a society frequently composed of men possessing the most turbulent, unruly dispositions, among whom may be found foreigners, mechanics, husbandmen, labourers, fishermen, and all those good and bad, who, destitute of a livelihood, embark from necessity to procure one.

Need we urge the propriety of bridling the dispositions of such a motley group, and bending their minds to one system of discipline? If such a number of the bad part of the above description, as may be supposed to belong to a first or a second rate ship, were on shore in one society, it may readily be imagined what trouble they would give magistrates, and how little the tedious form of a court of justice, its protracted mode of punishment, and feeble retribution would tend to prevent their misdemeanors. Great, however, as the charge appears, no vigilant commander, intrusted with the peace and good order of such a society, would compromise his authority, and prefer a tame submission to outrages to the exertion of that authority in repelling their offences.

The refractory and idle should be punished by a captain, not in the heat of passion, but in such a manner as to convince the offender that he deserves his punishment, and that all the officers and crew hold him in contempt. This will hurt his pride, if he is not an abandoned transgressor, and by future conduct he will endeavour to gain a good reputation. Nor should a captain ever so far forget himself, as to reprimand an officer publicly on the quarter deck, but choose the cabin to correct any error an officer may commit, for he should recollect, that in lessening an officer in the eyes of a ship's company he degrades himself, and gives a death-blow to the peace and discipline of the ship. Seamen are strict observers of the conduct of their superiors; therefore a captain has only by his own good example to enfore a strict obedience to his orders, and the duty of his ship will be executed with such alertness and pleasure as must give him every satisfaction.

A captain should leave the executive duty of the ship to the first lieutenant, except in particular cases, such as an engagement, in chase, in a squall, &c. He should, when in any difficulty, always call a council of war of his officers, on the quarter-deck. It is his duty to prevent all tyranny of superior officers, and should never allow insolence from an inferior to a superior to pass without a just censure.

No man should be struck by an officer or punished without his sanction; in short, all the duty and orders of the ship should receive his approbation, and be executed by the direction of the first lieutenant.

From the same principle why should a few designing men be suffered to take advantage of their local habitation on board a ship, because, unable to gratify their ambition, they oppose every re-

strictive measure that is adopted; and by their influence mislead the more credulous and ignorant part, who, if checked in time, might be reduced to obedience and good behaviour? It appears very extraordinary that the arm of power should ever have relaxed so much as to suffer its authority even to become disputed; that a decay so certain in its termination should be blindly preferred to the gentle exercise which keeps in force and progressively invigorates its salutary purposes. It is much safer to make laws than to alter them when established, and it is likewise safer to create a power than to alter or abridge it: hence, as the meritorious behaviour of a seaman at one time, and necessity at others, may render it necessary to promote him to the rank of an inferior officer, very few circumstances should induce an officer of superior rank to debase him to his former class; for the mind of a man, in a degraded state, always retains a deadly poison, which only requires opportunity to burst forth and show itself under the worst appearances. Is it not an august sight to see, when the first motive, the ruling principle of a great character, who possesses power, is the good and happiness of those over whom he presides; who renders justice to all, and dispenses, wherever they become due, rewards and punishments, with strict impartiality? Such should be the commander of every ship of war, and some bright examples we have in the American navy. And we may ask, in what respect can a command be more desirable than in the power of promoting the comfort and rewarding the industry, the integrity, and bravery of every person subordinate to it? We have already stated those internal regulations which are requisite to be adopted and publicly made known for the acquisition and preservation of order, method, and regularity on board a ship.

REMARKS ON PUNISHMENTS.

Points of service ought to supersede every private consi de ra tion? The officer that does not feel a zeal and pride to excel in his department is unworthy of the rank he holds; for how can he expect more from the men whom he commands than he himself exhibits? A proper degree of spirit, mixed with encouragement, will always forward the duty better than oaths and coersion. It should therefore be the study of every executive officer to instil with equanimity of temper, a spirit of emulation into his inferiors; which will in the event of success, or superiority, over any other ship of war, spread satisfaction over the whole; and all will in that case be as studious to excel, as the officer to whose plans and arrangements the merit is attributed. When people know that their actions are noticed, and that every reward or punishment is apportioned accordingly, they naturally become cautious of avoiding censure, and desirous to promote their own happiness and advantage.

Examples at first should be severe, and although a crime, at another time might be forgiven, in a well disciplined ship, it ought at this time to be regarded with more than ordinary severity ; for by this a great deal of punishment will be obviated, which otherwise might become necessary. When rules and regulations, which beget order and discipline, are known and established, it requires very little trouble to keep them in force ; the want of energy and vigilant attention are the only obstacles that would impede their operation. When no regular discipline is established, a good man frequently suffers from accident, whilst a man of bad character, by the same cause, escapes it.

This proceeds from caprice of disposition, or when crimes have passed so long unheeded, and the discipline is so much impaired, that every inadvertence is made a plea to restore it. But the act of a moment never should betray an officer to the commission of injustice. If a man commits an offence, he should be confined at least twelve hours, or until every spark of resentment has subsided ; as the distinction between guilt and error should be the grand criterion of forming an officer's judgment on the propriety of punishing or acquitting the culprit. To confound the good and the bad would be to destroy all emulation, and every stimulus that would incite a man to exertions deserving of superior notice. When a prisoner is summoned, let each party be heard, and every circumstance fairly and impartially stated ; if doubts exist, or it appears that the crime may have proceeded from ignorance, or mistake, the character of the accused should always be referred to, which will convince men of the importance of possessing a good name ; but, if punishment must be inflicted, it should be done so as to strike others with a sense of its necessity, and the force of its example. The task of pronouncing punishment must be painful to the feeling of every officer who is to decide on the case ; yet it is so necessary a thing, that all regularity and order is dependent upon it ; and this consideration should prevent any mistaken notion of lenity from betraying a captain to forgive where he ought to punish ; for, if his passions are to be affected by forced grimace, or pretended sufferings, punishment becomes only the ridicule of those who ought to suffer it. When a prisoner is released from his confinement, either in consequence of his innocence, or as an act of grace to his merit and former good character, it should be done as publicly as if punishment had been inflicted.

Example, in all cases, is the grand object, and as example on an individual tends to produce the same good effect on the whole, a selection should be made of those most notorious in their conduct ; that when their misbehaviour brings them to punishment, the severity of the law might be stretched to the utmost.

To conclude this subject, we have always observed that, where the discipline and subordination of a ship was regular, the people were happy ; and the officers and ship's company, from an acquaintance with each other's system, acquired and maintained a reciprocal respect for, and confidence in each other.

REMARKS ON CARRYING ON DUTY.

In the executive movements of a ship, nothing forwards the duty more than a proper division of the officers and ship's company. The officers commanding in different stations, should have the immediate superintendence and command in those parts: and previous to any duty being performed, the executive officer should send for the principal officers, and acquaint them with what is to be done, and the manner in which he wishes it to be performed. Silence, in almost every instance, is the chief criterion by which a ship's discipline may be estimated. Not that dark mysterious awe which fear begets, but a cheerful attention, wherein every man's mind is wrapt up in the service that is carrying on. The greatest attention should be paid to the orders of the executive officer, and of the principal officers at their stations, who are the only persons to repeat the orders given, or to reply to those received. Should one piece of service grow out of another, whilst the hands are upon deck, they should be piped specifically to perform that which is created anew, that the people may repair to their stations accordingly. When petty officers are so scarce as not to admit of any being stationed in the tops, the captains of them should have the whole command and responsibility there, and be the only people to repeat the orders given, or to reply to questions addressed. If this system be adopted and duly enforced, it will produce the happiest effects, in preventing confusion by a multiplicity of voices, and maintaining a proper subordination; and likewise by giving the officers discretionary powers, will ultimately save the executive officer an immensity of trouble, which he must undergo were he obliged to inspect every department himself.

General disposal of stores, &c. not in immediate use.

The boatswain's and carpenter's sea-stores should be so arranged in their store-rooms, that whatever may be wanted may be obtained with the greatest ease.

The bending sails, for instance, should be kept in one sail room; the awnings and spare sails in the other. The shroud hawser fitted and kept tied up in the hawser tier; three or four stout luff-tackles* fitted and kept below, to be ready to hand up in action, or in bad weather to secure a mast.

Spare buoys, in line of battle ships, are either triced up in the manger, kept in the coal hole, or forehold. In frigates they are usually triced up in the manger, and which should be slung and ready for use. Top-sail-sheet blocks stropped, and fitted with

* To prevent a rope from rotting off by being kept below, these tackle-falls should be unrove every four or five months, and appropriated to another use, and new rope rove in lieu thereof.

lashing eyes, in the block room. Slings from the lower yards triced up in the block room.

The spare tillers triced up between two beams, one on each deck. Rudder chocks slung, and at hand to fix if wanted. The top chains, in time of peace, kept in the corners of the tiers. The dead lights triced up in the passage to the well. There are many things kept below in ships of war, which foreign officers, upon their visits, are astonished to see, as supposing them to be without. These with arrangement and taste, might be disposed of to much advantage, both to set off their appearance and to be in readiness at the quarters the moment they are wanted. As for example, the match-tubs, wads, salt-boxes, powder-horns, pikes, tomahawks, and tube-boxes, which are absolutely necessary to be at hand; but particularly in a cruising ship; and at the same time it furnishes the executive officer with an opportunity of displaying his abilities in disposing them to advantage. The fire buckets are generally well painted, and hung in a row round the fife-rail, and the lower part of the breast work of the poop, having their lanyards flemished close down inside, which disposes of the whole that is allowed. Some ships that do not stow hammocks in the breast work of the poop, have a breast work made of pikes, which, in general, appears heavy and without taste. If there should not be any breast work, the best substitute is a half circle of tomahawks on each side, and in large ships two, which are light, and look well. The pikes, as they have no beauty in appearance, but are instruments necessary to be at hand, may be kept out of sight, (the handles either scraped very clean, or painted white, and the pike black) under the half deck. The tomahawks crossed and nailed up over each gun with a powder-horn between them. The wads made up in cheeses, and covered with canvass, having an emblematical painting on it. The salt-boxes painted in the same manner, and fixed over the gun. The tube-boxes ranged in a dry place, painted and numbered, for the guns; they are commonly put under the half deck, against the bulk head of the cabin, under the charge of the sentinel at the cabin door. The locks are in some ships, kept constantly on the guns, with covers cut out of solid blocks of wood, or cast lead; these covers may keep the wet from them, but cannot prevent the damp, which will, of course, render them unfit for use, and shows the impropriety of keeping them on. It appears better to place them in a dry situation, after having been fitted, with the number of the gun to which they belong affixed over them. One man at each gun should be taught to fix them on, who should be stationed to perform this particular service, when the drummer beats to quarters. Preventer lower braces on the yards, stopped into the bunt and down the stays. Strops should be fitted on the yard arms, with thimbles to hook the braces, which are kept in the tops. The spare cap is either kept before the fore or main-mast. The jack in the boxes before the main-hatch way under the ladders. The engine on the poop.

The geers coiled neatly up and triced to the deck. The signal colours kept in a chest on the poop. The ensigns rolled well up, and kept in the sail-room. The capstan-bars under the booms.

The fire booms in line of battle ships triced up on the lower gun-deck, between two beams, to be in readiness to rig out of the ports if required. In frigates, they are stowed with the other spars.

A boat's arm chest should be kept complete with muskets, pistols, cutlasses, and ammunition, under the sentinel's charge, at the cabin door, to be in readiness to hand into any boat that may be ordered away in the night time, or upon a sudden emergency.

Upon hoisting in a long boat.

To hoist in a long boat, let the fore-tackle be toggled into a long pendent from the after part of the fore-top-mast-head; also let the main-tackle be toggled into another pendent from the fore part of the main-top-mast-head. Guy the fore-tackle aft to plumb the chest tree by a stout guy from the main-mast-head, and guy the main-tackle over the side by a tackle from the main-yard-arm. Hook the main and fore-tackles to the stern and bow of the boat; and the main and fore-yard tackles both to the bow, which latter being thus hooked, will have a tendency to bear the bow of the boat from the side, at the same time the main-yard tackle will draw her aft clear of the anchor. The main-stay tackle is to be hooked into the bight of a slue-rope fixed to slue up the inner gunwale of the boat, and several capstern-bars are to be hung over the side as fenders for the boat to bear against. Being thus prepared, man all the tackles and hoist away, and when the boat is high enough, ease the yard-tackles, and allow her to swing into her birth a-midships.

Remark.—To prevent the fore-top-mast from drawing aft, it may be thought necessary to set up the foremast breast-back-stays, to each cat-head previous to hoisting.

Of getting guns on board.

To hoist guns on board with care and expedition, the main-tackle is to be fixed, and guyed out to the yard-arm, as stated under the preceding head, and the guns are to be slung by a sling about two fathoms long, the opposite bights of which are to be so seized as to form two eyes.

To sling a gun, one eye of the sling is to be placed over the pomiglion, the sling is then to be laid along upon the upper part of the gun, and lashed to it, by a few turns of a limp piece of rope, just on the muzzle-side of the trunnions, so that the gun, when poised, will hang obliquely with the breech down. If the gun is to be mounted, have its carriage ready at the gang-way to receive it. Now the main-tackle being guyed out to the main-yard-arm,

so as to plumb the hatchway of the craft containing the guns, and being hooked to the remaining eye of the sling, hoist up the gun; and when its breech is sufficiently high to enter the port, the people from within the port are to hook on an in-and-out-tackle to a small strap fixed to that eye of the sling which goes over the pomiglion. By this means they are to bouse in the breech of the gun, while the people upon deck are to ease in the yard-tackle, and allow the gun to settle in its carriage.

With a craft of guns on each side, and two tackles kept alternately going, much work may be done in a short time.

Mounted guns are to be delivered from their carriages into the craft by tackles fixed in the same way.

Where it is required to hoist the guns from the craft and to strike them down the hatchway, the main-tackle is to be fixed in the same way, otherwise it will now be found necessary to have a guy from the fore-mast head to guy the main-tackle to plumb the hatchway.—Indeed this guy may be useful in the former case.

Remark.—In transporting and getting on board anchors, guns, long boat, &c. much anxiety and labour may be saved, by proper attention to the fixing of the purchases. In the performance of this duty a ship's company are frequently worn with fatigue, for want of judgment in the boatswain, or his commanding officer. If the purchases be properly fixed, without tending to act against each other, and to bind against the side of the vessel, the hoisting on board a long boat, or transporting a sheet-anchor from the bow aft, is the work only of a few minutes.

ON EXERCISE.

Whenever the weather and the ship's duty will permit, the captain should direct the ship's company to be exercised at the great guns, small arms, pikes, &c. for surely assiduous attention to this most principal part of naval discipline can never too much engross the care of a commander, since the honour of his ship is so nearly allied to it, as the primitive step to victory, or a hard contested action.

Exercise of the great guns.

When the drum beats to arms, every officer and man, should repair to his respective station. The officers will muster their men, see every thing requisite for coming into action in its proper place, as it relates to their respective departments, and report the same when done to the first lieutenant.

The marines will fall in on the quarter deck, and after having been mustered and inspected, they will be placed in the most

advantageous ports for musketry, as the judgment of the commanding officer may direct.

When every thing has been reported to be in readiness for exercise or action, to the 1st lieutenant, he should first inspect the same, and then proceed to the following evolutions, viz.

1st.—*Silence!*

The men are to keep a strict silence, and pay an implicit obedience to their officer's orders.

2d—*Cast loose guns!*

The trainers are to cast loose the gun, and hook the train tackle, the swabbers at the same time will either coil down, or choke, the side-tackle falls, as the motion of the ship may render it expedient.

3d—*Take out tompions!*

The powderman is to remove the tompion from the gun, with an iron and mallet for that purpose, and place it out of the way, where it may be found after exercise.

4th—*Take off aprons!*

The trainer who stands abaft the gun is to take off the apron, and the one, who stands forward, should have the powder-horn ready to give to the captain of the gun, at the next word.

5th—*Handle powder-horns!*

The captain of the gun receives the powder-horn from the trainer, pricks the cartridge to know that it is home, and wipes the loose particles of powder off the priming wire, on the back of his hand, to learn if the charge is dry; if wet, he will report the same to the officer of his division, who will order it to be drawn, and the gun re-loaded.

6th—*Prime guns!*

The captain of the gun half cocks the lock, places a tube on the vent, tearing first the paper from its face, and covers it, as well as the pan, with loose priming, which he should be careful in bruising with his powder-horn.

7th—*Return powder-horns!*

The captain of the gun returns the powder-horn to the trainer, who removes it to a place of safety.

8th—*Lay on aprons!*

The trainer who took the apron off, lays it on again.

9th—*Point to the object!*

2—Points abaft the beam, &c. &c.

The trainers handle their crows and handspikes, and by the direction of the captain, train the gun to the object.

10th—*Stand by and take off aprons!*

The apron will be taken off as before, and the trainers will train the gun to the eye of the captain, who will take as exact aim as possible, either at the horizon, a ship in company, or a cask thrown overboard for that intent, for he should remember that in action one shot to do execution, is better than a whole broadside thrown hastily away. The swabber, who stands forward of the gun, will

have the powder-horn ready to renew the priming, should it flash in the pan, and the one who stands aft the linstock ready to give the captain should the gun hang or miss fire.

11th—*Fire!*

The captain of the gun, sure of his mark, is to discharge the piece, and instantly stop the vent with a twisted piece of oakum made for that purpose. The swabbers swab round the gun, and the sponger prepares to sponge it.

12th—*Run in guns!*

The men clap on the train tackle-fall and run in the gun. N. B. Most guns will recoil in of themselves, but seldom or ever far enough, or in a position for loading.

13th—*Sponge guns!*

The sponger is to sponge the gun; he should be careful in rubbing well round the chamber, to extinguish any loose particles of fire that may remain, as well as to knock the same off the sponge on the cell of the port. N. B. Every third round the powderman is to worm the gun.

14th—*Load with cartridge.*

The powderman receives the cartridge from the swabber, who stands aft, and shoves it into the gun as far as his arm will permit, being careful to place the torn end foremost and seam downwards. The boy receives the empty powder-box from the swabber, and returns it to the hatchway for a full one.

15th—*Ram home cartridge!*

The sponger rams home the cartridge, and the captain of the gun pricks it with his priming wire at the vent to know when it is home.

16th—*Shot guns!*

The swabber who stands forward, hands the shot to the powderman, who puts it into the gun. The captains of the guns may load with round and grape, but should never fire two round shot together, as it endangers the gun.

17th—*Wad to shot!*

The swabber who stands aft hands the wad to the powderman, who puts it into the gun.

18th—*Ram home wad and shot!*

The sponger rams home both and returns the sponge.

19th—*Man side-tackle-falls!*

The men on each side of the gun man the side-tackle-falls and prepare to run out the gun. The trainers, if they are exercising the weather guns, unhook the train-tackle, but if the lee ones, they ease the gun out.

20th—*Run out guns!*

The gun is run out, the captain taking particular care to overhaul the breeching that it should not choke the trunks and retard the progress of the gun.

After this they again return to the fourth article and so continue. The boarders, sail-trimmers, and firemen, should be frequently

called in the exercise to their different duties, as mentioned under that head, and the officers should be careful in preventing the men from slovenly passing through their exercise, or omitting the most minute particular.

When the exercise is over, the guns are to be secured and every thing returned to its respective department, the keys of the magazine returned and reports made to the first lieutenant that as above has been done, when he will order the retreat to be beat; the watch or all hands called as required, and the decks washed down. The gunner will see that all lights near the magazine are extinguished, and with his mates inspect the guns.

On Small Arms.

The manual and platoon exercise, so excellent and essential in itself, and so necessary to ships of war, have ever been unfortunately despised by the seamen of most services, and too much neglected by the commanders. This disgust to so warlike and useful a part of military science, arises from a strong affinity it has to the soldier, to whom seamen, from some strange cause or other, bear a most invincible dislike; however, captains and commanders of ships of war, convinced of its utility, ought to crush this obnoxious evil, and persevere in rendering the officers and men, from frequent exercise, familiar with it, not only as it relates to the ship, but as it relates to the service on shore, nor should the officers and seamen feel the least repugnance in thus acquiring a perfect practical and scientific knowledge of military discipline and duty, since the various events of war may require their services on shore, where honour and conquest is as likely to crown good discipline and order, as defeat and disgrace is sure to attend the want of it; and for the good of the public service, we would advise commanders to render themselves as familiar with military tactics as intense study and the duty of their ships will permit, for, as we have said before, the various events of war may often call forth the military talents of a naval officer to honour and advantage both to himself and his country. [Witness the gallant affair of St Jean d'Acre, where Sir Sidney Smith, with a handful of seamen and marines, assisted by a few Turkish soldiers, sustained a vigorous siege against the consummate skill and bravery of Bonaparte and his army, and though the works were out of repair, his brilliant military talent not only succeeded in defending the place, but reflected eternal honour on him and his followers.] And though the military skill of a naval officer may not be called into action, it must be a great satisfaction to say with the greatest commanders of former ages, "I can serve my country;" to use their favorite motto, *pro mare et terram.*

The field and platoon manœuvres, as practised by the army of the United States, are certainly too intricate and numerous for seamen, and require too much space for ships of war; therefore,

whilst we approve of the manual exercise, we shall give another method of forming companies, platoons, &c. which we recommend from its requiring less space, and for its conciseness and simplicity.

The men for instance, say one of the divisions, fall in, in a direct line, the tallest men in succession from the right, at order arms.

Each division is considered the same as a company in a regular regiment, the lieutenant of which acts as captain, the two midshipmen as lieutenants, one man as serjeant, and two as corporals.

The serjeant forms the men in a single line and calls the roll, and the senior midshipman forms the company in the following manner, viz.

1st—*Shoulder arms!—Call yourselves off from right to left!*

The whole shoulder arms, and the first man in the line calls out *right*, the one next to him *left*, the next again *right*, and so on, right and left, down the line. This should be repeated to prevent any mistake.

2d—*Form two deep—Left files to the right double—March!*

At the word march, the left files (that is to say the men who called left) step together in the rear of the right files, or the men to their right.

3d—*On the right—Close!*

The right hand men remain fast, and the remainder close on the right which forms the division or company, two deep.

The officer then divides the company into two equal divisions.

4th—*Second Division—two paces to the left—march!*

At the word march, the second division or platoon closes two paces to the left, which marks the distinction between each platoon or the first division may be ordered to close to the right, just as the officer conceives best for the position, or the most room.

5th—*Order arms—fix bayonets—shoulder arms!*

When this evolution is performed, the officer reports the company formed to the lieutenant, who comes in front and takes the command; he then proceeds to the following evolutions, viz.

1st—*Officers—take post in front of your respective divisions—march!*

The midshipmen take post some distance in front, and at the word march, they step off at ordinary time; the drums beat a march, and when within two or three paces of the line, they face about and the music ceases.—N. B. The senior midshipman commands the first division, and the junior midshipman the second.

2d—*Present arms!*

Both divisions present arms together, the officers salute with their swords, and the drums beat a march.

3d—*Shoulder arms!—Order arms!—Handle arms!—To the right, face!*

This evolution is performed by both divisions together.

4th—*Officers—inspect your respective divisions—march!*

The officers order the men to draw ramrods, which they drive forcibly into the barrel as the officers pass down the line, to show

that their pieces are not loaded, and also lay the ramrod across the muzzle to show that they are clean; as fast as each man is inspected, he will return his ramrod, face in front, and ease arms. The officers, after inspecting their respective divisions, will take post in front, and with a motion of their swords, report their divisions thus far inspected.

Shoulder arms!—Port arms!—Open pans!

The officers will again inspect their respective divisions, examine their locks and flints, and report the same as before.

Shut pans!—Shoulder arms!—Officer take post on the right of your respective divisions!

The officers take post on the right of their respective divisions, and the lieutenant will next proceed to the manual excercise, firing by volleys, divisions, &c.

The whole form in close column, 1st division in front.

Senior midshipman orders. *First division, one pace forward, march!* Junior midshipman orders. *Second division, to the right face, forward march!* And when in the rear of the first division, *Halt, front! Cover your files and dress!* This forms the company in a close column of four deep, and two companies may be thrown into close columns in the same simple way.

The Pike.

The pike is the most useful weapon used on board ships of war either in attack or defence; as a close column of pikes formed in order, with musketry in their rear, present such a barrier to the enemy that they can seldom or ever cut through, or sustain the force and weight of this phalanx in a well directed vigorous charge.

The men should be exercised with the pike, as before with small arms, as far as it relates to platoons, companies, columns, &c. and in the manual exercise as follows, viz.

N. B.—The pike is exercised in the right hand instead of the left as with a musket.

1st—*Shoulder arms!*—3 motions.

1st. The pike is lifted up with the right hand, to bring the end of the staff on a line with the knee. 2d. The pike is supported with the left hand, whilst the right takes a fresh grasp at its full extent. 3d. The left hand brought down again to the side.

2d—*Present arms!*—1 motion.

The pikes are lowered or bowed in front together, as a salute, and brought again to the shoulder.

2d—*Order arms!*—2 motions.

1st. The pike is let at once on the deck. 2d. The hand is brought in front and the pike supported against the shoulder.

4th—*Trail arms!*—1 motion.

The pike is grasped at a poise, and trailed by the side.

N. B.—Brought to the order as before.

5th—*Handle arms!*—1 motion.

The pike is grasped with the right hand in a line with the eye.

6th—*Ground arms!*—3 motions.

1st. The pike is thrust at the arm's extent in front. 2d. Kneel and ground the pike. 3d. Rise on the ranks. Take up arms the same way in three motions.

7th—*Port arms!*—1 motion.

The pike is let fall across the chest into the left hand.

8th—*Charge!*—2 motions.

1st. Face half a turn to the right. 2d. Bring the pike firm down to the side.

9th—*Shoulder arms!*—2 motions.

1st. The pike is brought to the shoulder. 2d. The left hand brought down to the side.

10th—*Advance!—Charge!*

This is the word of command to charge.

The Sword.

Few men require a more perfect knowledge of the sword than seamen of armed vessels, and unfortunately few possess it less. In action a good swordsman has not only a better chance of preserving his own life, but is more destructive to an enemy than from the tumult in boarding we might suppose, for with judicious parries and scientific cuts and thrusts he mows down all the inexperienced that oppose him. The practice and use of single sticks is excellent, but the sword exercise is the best and most exact.

NAMES OF THE SEVERAL PARTS OF A CANNON.

The Muzzle. That part of a cannon between the muzzle astragal and the quick of the mouth.

The Chace is the whole space from the trunnions to the muzzle.

The Second Reinforce begins where the first ends, and is made something smaller than the first; it comprehends the trunnions and the dolphins, or handles.

The First Reinforce is that part of a gun near the breech, which is made strong so as to resist the powder.

The Cascable. The hindermost part of the cannon, from the plate-band of the breech to the button, including the breech, listel, neck, and the knob.

The Neck. That part which joins the button to the breech.

The Breech is the solid piece of metal behind the gun, from the plate-band of the breech to the neck of the cascable.

The Trunnions are two cylindrical pieces of metal, in every gun, which project from the piece, and by which it is suspended upon its carriage.

The Dolphins are the two handles placed on the second reinforce of brass guns, resembling, formerly, the fish of that name. They are at present made of a square form. They serve for mounting and dismounting the guns. Cannon for light troops, and iron guns for the navy have no handles.

The Rimbases of the Trunnions. These serve to give additional strength to the trunnions, by attaching them more strongly to the lower part of the reinforce.

The Vent, in all kinds of fire-arms, is called the touch-hole ; it is a small hole placed at the end, or near to it, of the bore or chamber to prime the piece with powder, or to introduce the tube, in order, when lighted, to set fire to the charge.

The Bore. The vacant cylinder wherein the powder and ball are lodged.

NAMES OF THE MOULDINGS.

1. Base ring.
2. Breech astragal.
3. Fillet or listel of the breech astragal.
4. Concave quarter of the breech.
5. Girdle of the first reinforce.
6. Ogee of the second reinforce.
7. Chace girdle of the second reinforce.
8. Ogee of the chace girdle.
9. Inferior fillet of the muzzle astragal.
10. Muzzle astragal.
11. Superior fillet of the muzzle astragal.
12. The curve from the swelling to the astragal of the collar, or muzzle. The radius to describe it, is one seventh and two thirds of a seventh of the length of the piece.
13. Muzzle moulding.
14. Concave quarter round the mouth.
15. Relief of the breech.
16. Listel of the button's neck.

REMARKS ON STATIONING A SHIP'S COMPANY.

Stationing a ship's company, at every common evolution, is absolutely necessary for its being performed with regularity and despatch. In a large ship it requires more pains, and must be done on a large scale ; whereas, in a small ship, it may be reduced to the most simple and precise rules.

Watching the ship's company must be considered as the groundwork to the whole of the rest. This should be done by taking equal proportions of the strength and abilities of the seamen, for the different watches, and their appropriating them to the various stations according to their respective qualifications.

To ascertain the number of effective men, the widow's men, officers, marines, boys, and idlers, must be subtracted from the whole complement; the remainder will be the number to watch. But, as the quantity of ropes which lead on the quarter-deck of some ships, is greater than that on the quarter-deck of others, it will be difficult to affix the precise number of men which should be stationed in the waist and after-guard. This number must vary in the above proportion; but as the qualities that are requisite for one station will answer for the other, so it does not signify so much as it would, if the higher stations were liable to such a variation; and the officer who makes out his watch-table must be guided by that rule in either adding to, or diminishing from, the strength of those stations.

In small ships, it is most advantageous to have the greatest number of ropes on the quarter-deck, as they are immediately under the eye of the officer of the watch; but in large ships, where there is a profusion of men, and the quarter-deck is considered more as a parade than otherwise, and having the greatest room in the waist, it is preferable to lead them there. We shall, for these reasons, proportion them by that rule; but the ship's company should be prevented as much as possible from imbibing an idea, that because they belong to one part of the ship, they are not to go to another where their services may be wanted. By not adhering to this regulation, the ship's company, in small ships, is frequently kept at two watches, when they might be at three, if every man in the watch was compelled to assist in the duty which is carrying on.

A ship's company should first be divided into three distinct classes, viz. able seamen, ordinary seamen, and landsmen.

These classes are again to be equally divided into two classes, viz. larboard and starboard.

Each watch is to consist of the four following grades or divisions: viz. forecastle-men, foretop-men, gunner's-crew, carpenter's crew, after-guard, waisters, idlers, and boys; which grades are again divided into two equal parts: viz. first and second part, with a captain to each. Care should be taken in distributing the men according to their abilities, and the duty they have to perform. The oldest and best seamen should be stationed on the forecastle, and in the gunner's crew, the most alert in the tops; the ordinary in the after-guard, and the landsmen in the waist.

The captains of each grade should be chosen men, as the good conduct of each division depends a great deal on their example. The captains of the after-guard should also both be good seamen, and they are all considered answerable for every thing in their respective departments; it is also their duty to see the relief, and regulate the turns of the masthead-men and look-outs.

The look-outs are placed at sunset in the following order: viz.

Fore and main yard, fore and main top-men ; *forward*, one forecastle-man, and one foretop-man ; *gangways*, one gunner and one waister ; *quarters*, one after-guard, one mizentop-man. The petty officers of the watch consist, generally, of two boatswain's mates, two quarter-masters, two gunner's-mates, two helms-men, two captains of the mast, and a ship's corporal, or master-at-arms.

The idlers and officers' servants are attached to the watches, though excused from working ship, except in particular cases, such as *all hands*, &c.

The marines are divided into two watches with the seamen, and assist on the quarter-deck, from which a corporal's guard is extracted to mount as a provost-guard, whose duty it is to go round the ship at every hour, visit the sentinels, take charge of all prisoners, see that all is quiet below, and report the same to the officer of the watch. Each watch should have their hammocks numbered and marked against the men's names in the watch-bill, that the officers may know to whom they belong.

The watch should on no account ever be permitted to go below, without being regularly relieved.

On Divisions.

A ship's company should be divided into three divisions, with their respective officers to each, viz. one lieutenant and two midshipmen ; and mustered at least twice a week, to see that their clothes are kept in good order and clean.

The usual method of forming the divisions, is by dividing the able seamen, ordinary, and landsmen, into three classes each, which makes an equal distribution of the men, as the same divisions from the boarders, sail-trimmers and firemen in the quarter-list ; and the men by this plan are already selected for any sudden occasion, such as taking possession of a prize, landing, &c. as any one division, or part, can be immediately ordered on the service : on beating to divisions the men should fall in, and be mustered and inspected by their respective officers, and reported to the first lieutenant.

The officers of the divisions should keep an account of what slops their men may want or have had, as a satisfaction to them for a check against the purser.

The captain generally inspects the divisions, after which they are dismissed.

The stations of the different grades in staying and wearing.

The *first lieutenant*, commands on the quarter deck.

The *second lieutenant*, on the forecastle.

The *third lieutenant*, in the waist, and the midshipmen in necessary stations, under their superior officers.

The *boatswain*, on the forecastle.

The *gunner*, on the gangway.

The *carpenter*, in the waist.

The *boatswain's mates*, on the quarter deck, forecastle and waist.

The *quarter masters*, conn, letting-go the maintopsail braces, and bracing round the maintopgallant-yard.

The *captain of the forecastle*, to raise the fore-tack, gunner's mate the main-tack.

The *captains of the after-guard*, head braces.

The *second captains of the after-guard*, one to the stopper of the main brace; the other to let-go the cross-jack, and mizen top-sail braces.

The *captain of the waist*, let-go the fore-sheet.

The *second captain of the main-top*, let-go the main-sheet.

The *forecastlemen*, to the jib-sheets, one hand on the bowsprit to shift the sheets over the stay; to the fore-lift and trusses and fore-clue garnets, haul aboard the fore-tack, and rouse out the head bowlines.

The *foretop-men*, one division in the top, to attend the royal braces, shift the staysail-sheets over; overhaul the lee fore-lift, and bear the backstays aft, and abreast. The remainder on deck, to shift the stay-sails, tacks, set up the backstays, attend the fore-topgallant-braces, and haul out the main bowlines.

The *maintop-men*, one division in the top, as before, and on deck, to set up the backstays, brace round the topsail yard, and assist to haul aft the main sheet, and bowse taught the weather main lift.

The *mizentop-men*, one hand in the top, the next attend the boom-sheet.

The *gunner's crew*, stay-sail sheets, main tack, and reeve the main bowline.

The *carpenter's crew*, in the waist.

The *after guard*, main-lifts and tresses, mizen-stay-sail sheets.

The *idlers*, in the waist.

The *boys*, cross-jack, and mizen-top sail braces, and bowlines.

TABLE I.

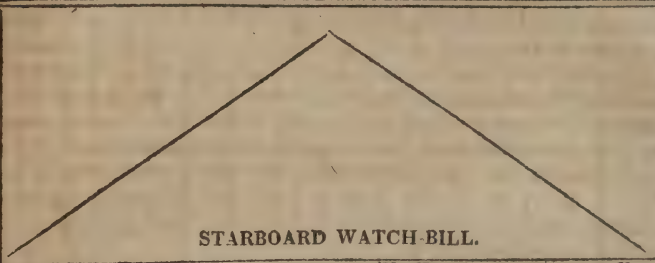
FOR WATCHING A SHIP'S COMPANY OF EVERY RATE.

RATES.	Number of Guns.	Full Complement.	Forecastle-men.	Foretop-men.	Maintop-men.	Mizentop-men.	After-guard.	Waisters.	Quarter-masters.	Quarter-gunners.	Carpenter's Crew.	Boatswain's Mates and Yeomen of the sheets.	Total number watched.	Number of Officers, Marines, Servants, Idlers, Boys, and
1st	100	839	60	63	69	27	94	171	13	30	13	8	548	291
2d	90	738	51	50	54	18	80	151	13	30	11	8	466	272
3d	80	719	56	59	66	18	80	151	9	23	8	6	476	243
.....	large 74	640	51	54	63	18	70	125	9	19	8	6	423	217
.....	small 74	590	45	45	51	13	60	115	9	19	8	6	376	214
.....	64	491	36	36	42	12	54	86	9	17	8	6	306	185
4th	50	349	30	30	36	12	30	39	7	13	6	4	207	142
5th	44	320	30	30	36	12	52	32	5	11	5	3	216	104
.....	38	284	21	24	27	10	44	32	5	10	5	3	181	103
.....	large 32	254	18	21	24	9	36	22	5	9	5	3	152	102
.....	small 32	215	15	18	21	..	25	15	5	9	5	3	116	99
6th	28	196	15	18	21	..	29	18	4	8	4	2	119	77
.....	24	175	13	16	18	..	25	14	4	7	4	2	103	72
.....	20	155	10	12	14	..	20	12	4	6	4	2	84	71
Sloops..	18	121	9	9	12	..	12	6	3	5	2	1	59	62

FORM OF A WATCH-BILL,

TO BE HUNG ON THE MAIN DECK FOR THE STARBOARD WATCH.

THE same form for the Larboard Watch, is to correspond exactly in numbers, with a column for the numbers of the hammocks. The second part may, as the occasion requires, form a Quarter Watch.



STARBOARD WATCH-BILL.

Boatswain's Mates.	No. Hammocks.	Forecastle-men.	No Hammocks.	After-guard.	No. Hamks.
1st part 2d part		1st Capt. 2d Capt.		1st Capt. 2d Capt.	
Quarter-masters		Foretop-men.		Waisters.	
1st part 2d part		1st Capt. 2d Capt.		1st Capt. 2d Capt.	
Gunners.		Maintop-men.			
1st part 2d part		1st Capt. 2d Capt.			
Carpenters.		Mizentop-men.			
1st part 2d part		1st Capt. 2d Capt.			

Having given the form of a watch-bill with a hammock-list annexed to it for the starboard-watch, it is to be supposed that the same form for the larboard one is made out, corresponding exactly in numbers, and as nearly in strength and abilities, as possible. The numbers of the hammock may represent the person in the station bill, which will make it PERPETUAL, and prevent a great deal of trouble in erasing names on every change. This may be exemplified, by supposing a boatswain's mate, belonging to the starboard-watch whose number is one; and, on a large sheet of paper, the table, as follows, may be constructed; with every man's station opposite to his number in the marginal column.

STARBOARD WATCH, QUARTER, AND STATION BILL.

No. Hammocks	Quarters.	Mooring and unmooring.	Reefing and Furling.	Making and shortening sail.	Tacking and Wearing.	No. of Divis.
1	Main Rigging	Starb.side of main deck.	Starb.side of main deck.	Starb.side of main deck.	Starb.side of main deck.	First.
2						
3						
4						
5						

Remarks on Watching a Ship's Company.

We have not taken any notice of the marines in this watch-bill, which will account for the difference of numbers stationed in the waist and afterguard ; as it appears preferable to leave them to the immediate disposal of their own officers, giving them instructions how to dispose of the men. The marines should have their hammocks marked with *red* figures, and births to mess in, apart from the ship's company.

As there are various opinions respecting the propriety of a ship's company being at three watches, it may not be superfluous to make a few remarks on the subject. An insufficient number of men cannot be offered as an objection, in large ships, and certainly not, with propriety, in small ones. A large frigate, that has not more men in her watch at two watches than a sixty-four has at three, with deeper courses, and every other sail in proportion, frequently excels her in the smartness of her manœuvres ; whilst, with such an inferior complement, she is at three watches, and the sixty-four gun ship at two. This circumstance, strange in its principle, and dangerous in its tendency, may be attributed to many

causes ; but the most prevailing ones are,—That captains prejudiced in favour of old customs, cannot divest themselves of the idea that their ships would not be safe with less than half the ship's company upon deck : and again, it is a very predominant opinion, that a ship's crew, being at three watches, acquire a habit of laziness, which disqualifies them for active pursuits when required ; and that, by inaction, a restlessness of disposition is created, which degenerates either into gambling, or a spirit for politics, two of the most baneful tendencies of a ship's company. Upon this ground an objection may fairly be started, if an adequate remedy cannot be found ; but, if it can, what solid advantages are not to be derived ? And where is the officer. possessed of experience, who cannot invent some work for them to perform, even if there should be really nothing in the common movements of the ship to give them employment ? We should then see their health and vigour preserved, unimpaired by fatigue, or the disastrous consequences of wet clothes, which men, at two watches, have neither the requisite time, nor means of getting dried. To the utility of the plan for keeping the ship's company at three watches, we are confident, the medical part of the service will give their sanction ; as, in a single point of view, it holds out an inestimable advantage against catching cold ; because, all the watch will then be enabled, and should be required, to walk the deck, which will prevent them from lying down on the damp deck, or in wet places, a practice that does more injury to the constitution of seamen, than at the moment can be imagined ; and which, when a ship's company is at two watches, it is scarcely possible to prevent.

Fixing a ship's company at three watches should be done after the ship has been some time in commission, and at sea, that it may be considered as an indulgence ; and that if, from sickness, desertion, or any other cause of being short of complement, it be necessary to reduce them to two watches again, it should not be considered as a hardship.

In large ships, the crew may be watched with a first and second part, and the quarters and stations regulated by them at three watches, giving each lieutenant a division to superintend, instead of those people at his quarters, according to the usual although improper method. Ships that have only four lieutenants, or less than that number, may consider the watch as a division ; but as it will more frequently happen to small ships than to large ones, to be obliged to put the ship's company to two watches, it appears preferable to consider them as always at two, and to style them accordingly whilst watching at three divisions.

OBSERVATIONS ON THE DIVISION OF A SHIP'S COMPANY.

Having frequently adverted to the term *division*, it may not be improper to describe precisely what our ideas on that head are. In large ships, or, as for example, on board a first rate, where there are nine lieutenants, the first (or executive) and signal officer, with the signal midshipmen, have that peculiar duty only to attend, which renders it impossible for them to take charge of a division; the remaining seven lieutenants have the ship's duty only to attend, which, in various cases, requires a part to be sent on service out of the ship, as in a prize; or to the assistance of a ship in distress; *or*, to the dock yard; *or*, to execute any duty on board, distinct from that which is carrying on upon deck which, if no previous arrangement has been made, it requires considerable time to adjust, and to make out lists of the men's names, who are to go with the officers; but if divided into proportional parts taken from the different stations and allotted to the respective officers, a division of the ship's company composing a proportional part of the strength and abilities of the whole, is ready at the shortest notice to leave the ship, properly commanded by a sufficient number of officers, without interfering with the strength of any particular station. The second and junior lieutenants, in large ships, and the junior only in small ones, should have the command of the boarders, who ought to constitute at other times a small-arm party, regularly trained to the uses of musketry, the pike and cutlass. If cudgel sticks could be provided, to teach the boarders the sword exercise, it might prove of the greatest advantage against an enemy. The first lieutenant commonly commands all the boarders unless they land, and then they are commanded by their respective officers. At these times an uniform, made of canvass, for a jacket and trowsers, edged with blue cloth, and a cap of the same kind, with the ship's name to which they belong painted on it, would not only add to the beauty of appearance, but be the means of preserving regularity, and of preventing, in a great measure, straggling and desertion.

REMARKS ON QUARTERING A SHIP'S COMPANY.

Quartering a ship's company requires the greatest attention; and when a ship is first put into commission, the people should be frequently exercised at their quarters, that they may be familiarized to the various occurrences which are likely to happen in action. When the men are perfect in one station at the gun, they should be appointed to another, that they may acquire a proficiency in the whole. The men should be quartered by the watch bill, taking equal proportions from the several watches. This plan will be found most advantageous in small ships, in which, when at

sea, the people are frequently called to their quarters in the night; and in this case, the men who belong to the watch will naturally be employed in getting their quarters ready, whilst those below are bringing up their hammocks. In a ship whose crew are at three watches, they should be compelled, in fine weather, to bring them up, stow them, and cover them well up in the nettings; which in the event of falling in with an enemy, would be of incalculable advantage.

The men at the guns should be stationed in the following manner:—the whole number divided into two equal parts, under a first and second captain, having their respective boarders, with their belts and cutlass; sail-trimmers; lantern men, to fetch a lantern; fire men with a bucket and swab; winch men, to pump the ship if required; port-tackle-fall men, to lower the port; and powder men to fetch powder; under the orders and direction of officers specially nominated to superintend these different duties.

On beating to quarters, the first captain, with his party, is to get the starboard guns ready; and the second captain, with his party, should get the larboard ones.

In fighting both sides at once, the people should be taught to work from two guns together: thus, whilst one gun is in, and the people are worming, sponging, and loading it, the other should be run out with the spare men from the gun which is in, in addition to those belonging to the gun which is to be run out, and so continue alternately to assist each other. When one side only is engaged, the first party of the men stationed at the gun should stand on the fore part of the gun, and the second party on the after part. The first captain should prick, prime, and point the gun to the object; the second captain should secure the powder horn and stop the vent. The boarders should sponge and load the gun; the fire men should choke the tackle-falls, and handle the crows and handspikes; the rest of the people should work the gun.

As nothing, in action, conduces more to keep up a brisk fire, than being well supplied with powder, every necessary arrangement should be made for that purpose, by stationing a sufficient number of men to hand it along the passages. and dividing the supply as much as possible, that no confusion, or mistake, may happen in distributing the cartridges. In three deckers it is usual to supply the lower deck with cartridges from the grand magazine, handed up at the fore hatchway; the middle deck, from the fore-hanging magazine, handed along by the sail-room up the main hatchway; the main deck, forecastle, and quarter deck, from the after magazine, with whips at the foot of the ladder coming off the middle deck. Positive orders should be given, that no cartridge shall be given out to any person who does not deliver an empty cartridge box.

As soon as the ship's company are stationed to their different duties in working ship, &c. they should be quartered and exercised at the great guns and small arms as often as the duty of the ship

will permit; and this exercise should be rendered as simple as possible, for the more familiar the men are with the exercise the more active are they in action, and the less confused. There are generally six; but, in our opinion, there should be seven men to each gun, and a boy to every two guns to carry powder; for, whilst this enables them to work the gun brisk in the commencement of the action, it does not distress it by calling away the sail-trimmers or fire men, nor is it so soon unmanned, for it has been found in several actions that more men have been lost by their moving about, than by their being stationary. The following method presents many advantages.

Let seven men be stationed at each gun with a boy to every two guns to carry powder, and let each man have his allotted duty, which prevents all confusion; and as it is the duty and interest of captains to be as economical of their men's lives as possible, they will find this plan a good one. It has often been seen, in action, where two men run for the same thing, they have both been killed by one shot; this harum-skarum conduct caused confusion, and confusion lost the ship. The following duty should be allotted to each man at the gun, viz.

1*st The captain*:—He is to direct the men of his gun in all their evolutions. He is to point, prime, and fire the gun, being careful, the moment she is discharged, to stop the vent, with the twisted piece of oakum; a quantity of which, he should have for that purpose, in a small tin box with tubs for primers, buckled round his waist. He is also to prick the cartridge to know when it is home.

2*d The rammer and sponger*:—He stands abaft the gun on the larboard side, and before the gun on the starboard side, next to the muzzle. He is to sponge the gun and ram home the charge, and should be very careful in knocking off loose particles of fire from the sponge, on the sill of the port. When he has rammed home the charge, he should lay his sponge always athwart the deck, whilst he runs out the gun.

3*d Powderman*:—He stands next to the muzzle, opposite to the sponger, he is to receive the charge and load the gun; he is to be careful in putting the cartridge with the torn end foremost and seam downwards; shot next to the cartridge, and wad next to the shot; every third round he is to worm the gun.

4*th and* 5*th* are swabbers: they stand opposite each other next to the sponger and powderman; the one that stands aft, hands the cartridge and the wad to the powderman, and the one that stands forward hands the shot; they are also to swab round the gun, to take up loose particles of powder and assist the boy in fetching it.

6*th and* 7*th* are trainers; they stand opposite each other next to the breech, to train, elevate, or depress the gun as the captain directs.

Boy, fetches powder from the hatchway, and gives the cartridge-box to the swabber, and receives the empty one which he imme-

diately hands below and receives another full one. The above regulations give three men to each tackle-fall for running out the gun, and a captain to direct it, as they are killed, or wounded, the next takes his place, and when the gun is unmanned, the officers must remove men from other guns, make a virtue of necessity, and do the best they can.

There are several methods of quartering a ship's company; but the following two quarter bills, one for a frigate of 44 guns, and the other for a privateer of 18 guns, will serve for officers to deduce theirs from.

A QUARTER BILL.

For a frigate of 44 guns, with a compliment of three hundred men.

Quarter Deck.

The captain to command the whole,	1
1st lieutenant to assist in fighting the ship,	1
Two midshipmen as aid-de-camps,	2
The master to attend the steerage,	1
A master's mate to attend the braces and working ship,	1
A midshipman to fight the quarter deck guns,	1
Boatswain's mate and six men* to repair damages,	7
Two quarter-masters and two men at the helm,	4
A quarter-master at the conn,	1
Seven men to each gun,	35
A hand at the hatchway to receive powder,	1
Boys as carriers,	3
Purser and captain's clerk to take minutes,	2
	60

Fore-castle.

A master's mate to command,	1
Boatswain and four men to repair damages,	5
Boatswain's mate to assist working ship,	1
Seven men to each gun,	14
A boy as carrier,	1
A hand to give powder from the hatchway,	1
	23

* Two of these should be captains of the afterguard to attend the head braces.

Main Deck.

Second lieutenant and a midshipman foremast division,	2
Third ..... aftermost	2
Boatswain's mates working ship,	2
Captains of the mast at the mast,	2
Seven men to each gun,	105
Boys as carriers,	7
Two men at each hatchway to receive powder,	6
	126

Tops.

A midshipman and four men in the fore and main-tops with small arms, and two men in the mizen,	12
Carpenter, his mate and two men in the wings,	4
	16

Magazine.

Gunner, his mate and two men,	4
Light room, the cook,	1
Master at arms, ship's corporal and six men in the 'tween decks to hand powder,	8
	13

Cock-pit.

Surgeon and his assistant,	2
Chaplain and two loblolly boys,	3
	5

Marines.

First and second lieutenant,	2
A sergeant and two corporals,	3
A drummer and fifer,	2
Rank and file,	50
	57

Sum total, 300.

N. B. The marines should be stationed on the quarter deck, fore-castle and gangway, with musketry.

A QUARTER BILL

For a Privateer of 18 *Guns and* 155 *Men.*

N. B. Privateers of this class should carry one hundred and eighty-five men as prize crews, and always, if possible, return to port when reduced below one hundred and forty.

Captain to command the whole,		1
First lieutenant to assist,		1
Prize master as aid-de-camp,		1
Master attend the steerage,		1
2d lieutenant and one prize master, 1st division of guns,		2
3d lieutenant 2d division,		2
Clerk to take minutes,		1
Prize master, forecastle to command,		1
Boatswain and four men forward to repair damages,		5
Boatswain's mate and four men aft,		5
Prize master and four men in fore and main-tops, small arms,		10
Two men in the mizen-top,		2
Gunner and two men in the magazine,		3
One prize master to work ship aft,		1
Two captains afterguard head braces,		2
Boatswain's mate in the waist,		1
Master at arms in the light room,		1
Ship's corporal and four men hand powder,		5
Carpenter, mate, and two men in the wings,		4
Surgeon, mate, and one hand to dress the wounded,		3
Seven men to each gun with the boys,		69
Helm and conn,		2
To receive powder on deck,		3
Two men attend the main braces,		2
One lieutenant,	Marines.	1
One sergeant,		1
Two corporals,		2
Drummer and fifer,		2
Rank and file,		20
		155

TABLE II.

SHOWING THE STATIONS OF THE DIFFERENT OFFICERS AT QUARTERS.

The letters in the columns signify the stations, and the figures the number of petty officers at each; as for example, Q D, quarter deck—F c, forecastle—Mn D, main-deck—Md D, middle deck—L D, lower deck—Pp, poop—Magaz, magazine—L r, light room.

Class of Ships.	Lieutenants.									Marine Officers.				Mates.					Midshipmen and Clerks.						Master.	Purser to superintend	Boatswain.	Gunner.	Carpenter.	Master-at-arms.	Ship's Cook.
	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth	Captain.	Lieutenants. First	Lieutenants. Second	Lieutenants. Third	Signals	Forecastle.	Main deck.	Middle deck.	Lower deck	Aids-de-camp.	Signals and to take minutes.	Quarter deck.	Forecastle	Upper deck.	Middle deck.	Lower deck.							
100	Q D	L D	Md D	Mn D	Signals	L D	Md D	Mn D	F c	Pp	Pp	Pp	Pp	1	1	1	1	2	3	4	2	1	4	5	6	Q D	Handing of Powder.	F c	Magaz	At the well and the wings.	L r	L r
90	Q D	L D	Md D	Mn D	Signals	L D	Md D	Mn D	....	Pp	Pp	Pp	Pp	1	1	..	1	2	3	4	2	1	4	5	6	Q D		F c	Magaz		L r	L r
80	Q D	L D	Mn D	Signals	L D	Mn D	F c	.....	....	Pp	Pp	Pp	Pp	..	..	1	..	2	2	2	2	1	5	..	5	Q D		F c	Magaz		L r	L r
large 74	Q D	L D	Mn D	Signals	L D	F c	.....	.....	....	Pp	Pp	Pp	Pp	..	..	2	..	1	2	2	2	1	5	..	5	Q D		F c	Magaz		L r	L r
small 74	Q D	L D	Mn D	Signals	F c	.....	.....	.....	....	Pp	Pp	Pp	Pp	..	..	1	..	2	2	2	2	1	5	..	5	Q D		F c	Magaz		L r	L r
64	Q D	L D	Mn D	Signals	F c	.....	.....	.....	....	Pp	Pp	Pp	....	..	..	1	..	2	2	2	2	1	5	..	5	Q D		F c	Magaz		L r	L r
50	Q D	L D	Mn D	L D	.....	.....	.....	.....	....	Pp	Pp	.....	....	..	..	1	..	1	2	1	2	1	2	..	2	Q D		F c	Magaz		L r	L r
44	Q D	Mn D	Mn D	.....	.....	.....	.....	.....	....	....	Q D	Q D	....	..	..	2	..	..	1	1	1	..	4	..	..	Q D		F c	Magaz		L r	L r
38	Q D	Mn D	Mn D	.....	.....	.....	.....	.....	....	....	Q D	.....	....	..	..	2	..	..	1	1	1	..	4	..	..	Q D		F c	Magaz		L r	L r
large 32	Q D	Mn D	Mn D	.....	.....	.....	.....	.....	....	....	Q D	.....	....	..	..	2	..	..	1	1	1	..	4	..	..	Q D		F c	Magaz		L r	L r
small 32	Q D	Mn D	Mn D	.....	.....	.....	.....	.....	.. ..	. .	Q D	.....	....	..	..	2	..	..	1	1	1	..	4	..	..	Q D		F c	Magaz		L r	L r
28	Mn D	Mn D	Mn D	.....	.....	.....	.....	.. ..	....	...	Q D	.....	....	..	..	2	..	..	1	1	1	..	2	..	..	Q D		F c	Magaz		L r	L r
24	Mn D	Mn D	.....	.....	.....	.....	.....	.....	....	....	Q D	.....	....	..	..	2	..	..	1	1	1	..	2	..	..	Q D		F c	Magaz		L r	L r
20	Mn D	Mn D	.....	.....	.....	.....	.....	.....	....	....	Q D	.....	....	..	..	2	..	..	1	1	1	..	2	..	..	Q D		F c	Magaz		L r	L r
18	Mn D	Mn D	.....	.....	.....	.....	.....	.....	....	....	.....	.....	....	..	..	1	..	..	1	1	1	..	1	..	..	Q D		F c	Magaz		L r	L r

TABLE II.—THE GENERAL APPROPRIATION OF MEN AT QUARTERS, FOR THE DIFFERENT CLASSES OF SHIPS IN THE AMERICAN NAVY.

Class of Ships.	Whole Complement of Men.	Number of Officers.	Number of Mates, Midshipmen, and Clerks.	Number of Boys, of the 1st, 2d, and 3d Class.	Number of Widow's Men.	Total Number Quartered.	Number of Guns on each Deck					Number of Men on each Deck.					Number of Men to each Gun.					Tops.				Small Arms.	Magazines, and to hand powder along the passages from the			Whip up, or to hand powder from the			Store-Rooms.			Helm and Cann.	Well and Wings.	Cockpit.
							Quarter-deck.	Forecastle.	Main-deck.	Middle-deck.	Lower-deck.	Quarter-Deck.	Forecastle.	Main-deck.	Middle-deck.	Lower-deck.	Quarter-deck.	Forecastle.	Main-deck.	Middle-deck.	Lower-deck.	Main.	Fore.	Mizen.	Rigging.		Attend Signals.	Grand.	After.	Hanging.	Fore-hatchway.	Main-hatchway.	After-hatchway.	Boatswain.	Gunner.	Carpenter.	Purser's Steward.			
100	339	24	31	40	8	736	10	4	30	30	30	50	20	150	180	225	10	10	10	12	15	10	3	2	2	11	6	25	7	16	7	4	8	1	1	1	1	5	6	6
90	738	20	29	37	7	645	6	4	30	30	28	30	20	135	150	196	10	10	9	10	14	10	3	2	2	11	6	25	7	16	7	4	8	1	1	1	1	5	6	5
80	719	19	20	35	7	638	16	6	32	—	30	30	30	192	—	225	10	10	12	—	15	18	3	2	2	12	6	25	12	—	7	4	8	1	1	1	1	5	6	4
large 74	640	18	20	32	6	564	14	4	30	—	28	63	18	180	—	196	9	9	12	—	14	18	3	2	2	11	6	21	12	—	7	4	8	1	1	1	1	5	6	4
small 74	590	17	20	30	6	517	12	4	28	—	28	54	18	140	—	210	9	9	10	—	15	17	3	2	2	11	6	19	9	—	5	4	4	1	1	1	1	5	6	4
64	491	16	20	25	5	425	8	4	26	—	26	28	14	143	—	156	7	7	11	—	12	17	2	2	2	10	5	14	6	—	4	3	5	1	1	1	1	5	6	4
50	349	14	13	23	3	296	8	4	24	—	22	24	12	96	—	110	6	6	8	—	10	10	2	2	2	—	2	9	5	—	4	3	5	1	1	1	1	4	4	3
44	330	11	9	20	3	288	14	6	28	—	—	49	18	168	—	—	7	6	12	—	—	9	2	2	2	—	2	7	6	—	5	3	5	1	1	1	1	3	4	3
38	284	11	9	19	3	243	12	4	28	—	—	42	12	140	—	—	7	6	10	—	—	8	2	2	2	—	—	7	5	—	4	3	5	1	1	1	1	3	4	3
large 32	254	11	9	18	3	214	10	4	26	—	—	30	12	130	—	—	6	6	10	—	—	9	2	2	—	—	—	6	4	—	4	2	4	1	1	1	1	3	3	3
small 32	215	11	9	16	2	178	8	4	26	—	—	20	10	117	—	—	5	5	9	—	—	4	1	1	1	—	—	4	4	—	2	2	2	1	1	1	1	3	2	3
28	196	10	7	14	2	163	6	4	24	—	—	15	12	108	—	—	5	6	9	—	—	4	1	1	1	—	—	7	—	—	2	2	2	1	1	1	1	3	2	2
24	175	10	7	14	2	142	6	2	22	—	—	15	6	88	—	—	5	6	8	—	—	5	1	1	1	—	—	7	—	—	2	2	2	1	1	1	1	3	2	2
20	155	10	7	13	2	123	4	2	20	—	—	10	5	80	—	—	5	5	8	—	—	4	1	1	1	—	—	7	—	—	2	2	2	1	1	1	1	3	2	2
18	121	9	4	13	1	94	4	2	18	—	—	8	4	54	—	—	4	4	6	—	—	2	1	1	1	—	—	7	—	—	2	2	2	1	1	1	1	3	2	2

OBSERVATIONS ON THE FOREGOING TABLE.

The calculation for regulating the men at quarters, differs from that of all other stations, by including the marines, boys of the first class, and idlers. The boys of the first class may be intrusted to hand powder along the passages. The cooper should be quartered in the magazine, to be ready to open powder barrels. The ship's cook and master-at-arms in the light room. In line-of-battle ships, proper men should be quartered at the after-guns, in the gun room, to be ready to attend the relieving tackle; and in frigates, men should be appointed to attend this duty. The carpenters in frigates should assist, when not occupied in their own line, to hand powder between decks. The assistance of the purser, to superintend the distribution of powder at the hatchways, and to arrange and command the people stationed to hand it along, appears to be a much more eligible mode of employing his services than to station him in the cockpit. Line-of-battle ships that have carronades on their poop, may either work them with the small arm party, or take one man from each gun that can best spare him. The riggers in line-of-battle ships should assist at the guns whilst they are not occupied about the rigging. In frigates, one man from each gun, on the forecastle and quarter-deck, to be stationed at this service.

REEFING AND FURLING SAILS.

It will appear by the following table of proportions for furling sails, compared with the number of men watched, what an advantage a first rate has over every other class of ships; for with smaller yards than, and sails not so deep as, those of an eighty gun ship, they have more men; which, with the advantage of much more room to work in, will evince how they ought to excel in their manœuvres. Forty-four gun frigates, and sloops of war are evidently the weakest in their working hand, although they have men enough to work their guns, which is generally considered as the criterion to judge by. In small ships, the idlers are usually sent on the main yard to furl the main sail: and the boys on the mizen top sail, and top gallant yards. In ships that have no station bill for manning the yards, this will answer the purpose, taking care to have an equal number of men on each yard arm of the different yards; and, if time will permit, the men should be selected by their size, and the tallest men placed in the bunt, to reduce them gradually to the shortest at the yard arms.

Officers, in their respective stations, a midshipman in each top.

Topsail yards, the topmen of the larboard watch, lay out on the larboard yard arm; the starboard watch, on the starboard: the captains of each watch to the easings.

Fore-yard, forecastle-men and waisters.

Main-yard, gunner's crew and afterguard.

Forecastle-men, stow the jibs and main-stay-sail.

Foretop-men, the top-mast-stay-sails, &c.

After-guard, mizen-stay-sail and spanker, mizen-top-men, gaff-top-sail and peak.

Main-top-sail braces, quarter-masters.
Fore-top-sail braces, captains of the after-guard.
Mizen-top-sail braces, boys.
Fore-topsail-haulyards, forecastle-men, foretop-men and waisters.
Main-top-sail-haulyards, main-top-men, after-guard, and marines.
Mizen-top-sail-haulyards, mizen-top-men, idlers, and boys.

N. B.—When the sails are furled, the boatswain should square the yards. In reefing, the men should not lay out until the yards are down by the lifts, and the word given, *trice up*, *lay out*, when they lay in, the commanding officer should order them down to the top-sail-haulyards, leaving only one division in the top to light up the geer, and when the top-sails are hoisted, trim sails.

TABLE IV.

Proportions for stationing men at furling sails for all classes of ships of war.

Class of ships.	Main			Fore			Mizen		Stow the		Total number of men stationed.
	Yard.	Top-sail-yard.	Top gallant-yard.	Yard.	Top-sail-yard.	Top-gallant-yard.	Top-sail-yard.	Top-gallant-yard.	To furl the sprit-sail.	Jib.	Mizen-stay-sail.	
100	54	40	8	50	36	8	24	6	20	12	4	262
90	50	36	8	44	32	6	20	6	16	10	4	232
80	60	40	8	54	36	8	24	6	20	12	4	272
large 74	56	40	8	52	36	8	24	6	20	12	4	266
small 74	42	36	8	40	32	6	20	6	16	10	4	220
64	38	32	6	36	30	6	18	6	14	9	4	199
50	32	26	6	30	24	6	14	4	12	8	3	165
44	40	32	6	38	30	6	18	6	14	9	4	203
38	34	26	6	32	24	6	14	4	12	8	3	169
large 32	26	22	6	22	20	4	12	4	8	6	2	132
small 32	22	18	4	18	16	4	10	4	8	5	2	111
28	20	16	4	18	14	4	10	4	6	4	2	102
24	18	16	4	16	14	4	8	4	6	4	2	96
20	16	14	4	14	12	4	6	4	6	3	2	85
18	14	12	4	12	10	4	6	4	6	3	2	77

TABLE V.

FOR MOORING AND UNMOORING.

Class of Ship.	At the Helm.	At the Capstan Bars.	To hold on the Messenger.	Nippers.			Cable.				Overhaul the Cat, and rig the Davit, &c.	To get the Fish Tackle along the Gangway.	Top.		
				Clap on	Hold on	Take off	Haul into the Hatchways	Coil away	Light out the Veering.	Rouse up the Veering			Main	Fore	Mizen
50	1	77	4	4	3	3	2	20	6	35	10	9	7	7	4
44	1	62	4	4	3	3	2	20	4	35	10	7	7	7	4
38	1	52	3	4	6	2	2	14	4	25	7	7	6	6	4
Large 32	1	48	2	4	6	2	2	12	4	21	7	6	5	5	4
Small 32	1	38	2	3	5	2	2	10	3	19	7	6	5	5	..
28	1	45	2	3	5	2	2	10	2	19	6	6	5	5	..
24	1	38	2	3	4	2	1	8	2	16	6	5	4	4	..
20	1	31	2	2	4	2	1	8	2	10	5	2	4	4	..
18	1	18	2	2	2	2	1	8	2	8	2	2	3	3	..

OBSERVATIONS ON MOORING AND UNMOORING.

It is as necessary for preserving regularity in mooring and unmooring ship, to have a station-bill, as in most other points of service ; but as it is impossible to employ all the people in large ships, at this specific duty, without creating confusion by too great a number, or imposing the weight of it on one particular class, the necessary table has been computed only from a fifty gun ship downwards, upon the supposition that all ships above that rate may perform it with two watches, reserving the third to make sail, &c.

The people are disposed of as follows : one quarter master at the helm ; the afterguard and waisters at the capstan ; a few gunners, and all the idlers, to hold on the messenger and light it round. The fore-top men to clap on the nippers, and the main-top men to take them off and hold them on ; waisters at the corners of the hatchways to haul in the cable ; the quarter masters, forecastle men,

and, in small ships, some of the gunners, to coil away and light out the veering cable ; fore and main-top men, to rouse up and veer away ; gunners to get the fish tackle along the gangway : forecastle men to overhaul the cat and get the davit rigged, &c We have taken no notice of the marines, boys, or idlers, as the number of the former is doubtful from their employment as sentinels, &c.

The boys commonly attend the nippers, to carry them forward when taken off, and the regulation respecting idlers, who are excused from duty, differs in almost every ship ; and those who attend, assist in lighting round the messenger and holding it on with the gunners and carpenters. The marines always assist at the capstan, which will make up for the deficiency of the men absent in boats, or who may be sick.

REMARKS ON MAKING AND SHORTENING SAIL.

The peculiar difficulty, as we have before remarked, of stationing the whole of a large ship's company to perform some points of service, is also experienced in making sail ; for it scarcely requires more men aloft, to make sail in a first rate, than it does on board a large frigate ; consequently, the additional number, if all were stationed in a large ship, would incommode each other, and be the means of impeding that duty which they are meant to accelerate ; but in a small ship, all may be attached to separate occupations, without feeling any inconvenience from their number. In line of battle ships, that are at three watches, if the watch upon deck is not adequate to the duty which is to be performed, it is usual to call the one which follows it ; therefore the officers, in their stations, must supply the deficiency of a station bill, by seeing every thing clear and properly disposed.

Cruising ships should never be without a station bill, to make and shorten sail, for independent of the smartness and regularity of the movement gained by it, considerable advantage would be derived in chasing an enemy, who might parctise measures, that would require an instantaneous shortening or making of sail to baffle his endeavours ; or, in the night time, when an officer is prevented from seeing every station filled, which might be neglected unless this previous regulation had been established. For these reasons, as in a former case, the following Table commences with a fifty gun ship. [*See Table VI.*]

REMARKS ON TACKING SHIP.

The same reasons which we have shown for requiring men to be stationed at mooring ship and making sail, may be offered, for the same purpose, in tacking ship ; with the addition, that, as it is so frequently performed, and sometimes in the night, where the single omission of letting go a rope might be of fatal consequence, it appears more necessary, if possible, than in the other cases. [*See Table VII.*]

TABLE VI.

FOR STATIONING MEN TO MAKE AND SHORTEN SAIL FROM A FIFTY GUN SHIP TO A SLOOP OF WAR.

Rates.	To let the reefs out of the top sails.			To loose and furl the top gallant sail, and to take in and set the royal.			To send down the studding sail gear, and to set and take in the topmast studding sails.		To get the top mast studding sails ready to be sent up, and to haul them down.		To get the lower studding sails ready to set, and to haul them in.	To get tackles on the top-sail lift, and to take them off.		To carry the lower studding sail guy forward, and to bring them aft.	In the tops.		
	Main.	Fore.	Mizen.	Main.	Fore.	Mizen.	Main yard.	Fore yard.	Main.	Fore.		Main.	Fore.		Main.	Fore.	Mizen.
50	10	8	6	6	6	4	8	8	12	12	10	2	2	2	20	16	2
44	10	8	6	6	6	4	8	8	9	12	10	2	2	2	20	16	2
38	8	8	6	4	4	2	6	6	9	6	9	2	2	2	15	12	2
large 32	6	6	4	4	2	2	6	4	8	6	8	2	2	2	14	11	3
small 32	6	6	Some of the afterguard.	4	4	Boys of the first class.	6	4	8	5	6	2	2	2	11	8	Boys of the 2d class.
28	6	6		4	4		4	4	8	5	6	2	2	2	11	8	
24	6	6		2	2		4	4	7	4	5	2	2	2	10	8	
20	4	4		2	2		4	4	6	2	4	2	2	2	8	6	
18	4	4		2	2		4	4	4	2	3	2	2	2	6	3	

The top men, after letting the reefs out, to hook the burtons on the top-sail yards, and rig out the booms. The men who loose the top gallant sails should set the royals; those stationed in the tops are immediately to trice the stay sails up, if required, and to get the royals and top gallant studding sails ready to set. The forecastle men, after having bowsed the lifts, trusses and reef-tackles taut, are to get their studding sails to hand; but some ships, in the day time, have their topmast studding sails stopped in the shrouds, with the inner yard arm resting in the chains, the tack and halyards bent, and stopped up to the lower yard, after being sufficiently overhauled for bracing up; which appears a good and expeditious method. The afterguard and waisters are not stationed to any particular service, as their assistance must be appropriated to whatever is going on. The stations are calculated for both sides, so that the officer, who makes out a bill from these statements, must appoint the starboard watch to attend on the starboard side, and the larboard watch on the larboard.

TABLE VII.

FOR STATIONING THE MEN, FROM A FIFTY-GUN SHIP TO A SLOOP OF WAR, AT TACKING.

RATES.	Tops.			Braces.								Tacks to let-go and overhaul.		Bowlines to let-go.		Sheets to let go.															
	Main	Fore	Mizen	Main	Main-topsail	Main-top-gallant	Fore-top-gallant	Cross-jack and bowline	Mizen-topsail & top-gallant	Spritsail and backstay-falls	Main chains.	Mizen staysail-brails and backstay-falls.	Driver-boom.	Main	Fore and bowline	Main	Maintop	Brail up the main-topmast staysail, and haul aft the jib and staysail-sheets.	Main	Fore	Main-topmast staysail, and to get aft the other.	Jib and flying-jib.	Fore-topmast staysail.	Mizen and topmast stay-sails.	At the helm.	Main-bowline to haul round.	Maintop-bowline to haul round.	Main-tack to man.	Light over jib and staysail-sheets.	Haul aft the main-sheet.
50	3	3	1	20	11	4	3	6	3	10	2	12	5	5	2	1	1	11	1	2	5	2	1	1	3	20	20	22	2	14
44	3	3	1	40	11	3	3	6	3	10	2	13	5	4	2	1	1	11	1	2	5	1	1	1	3	20	18	20	2	16
38	3	2	1	30	7	3	3	5	3	10	2	8	4	4	2	1	1	10	1	1	5	1	1	1	3	20	16	12	2	17
Large 32	3	2	1	25	7	3	3	3	–	8	2	7	4	3	1	1	1	8	1	2	4	1	1	1	2	15	15	8	1	13
Small 32	2	2	–	17	7	2	2	3	–	5	2	5	3	3	1	1	1	6	1	2	4	1	1	1	2	13	12	8	1	7
28	1	1	–	17	7	2	2	3	–	7	2	5	3	2	1	1	1	6	1	2	4	1	1	1	2	13	12	6	1	10
24	1	1	–	17	6	2	2	–	–	5	2	5	3	3	1	1	1	5	1	1	3	1	1	1	2	12	8	7	1	8
20	1	1	–	12	5	2	2	–	–	4	2	4	3	2	1	1	1	4	1	1	3	1	1	1	2	10	6	4	1	7
18	1	1	–	8	5	2	2	–	–	3	2	3	2	2	1	1	1	3	1	1	2	1	1	1	1	5	3	2	1	5

EXPLANATION OF THE FOREGOING TABLE.

The marines, as in former cases, are not stationed ; nor are the idlers and boys ; it being an invariable rule to station the former on the quarter deck, where they assist in whatever duty is going forward. The idlers are in all ships stationed at the main-tack ; and the boys at the cross-jack braces and mizen top-bowline. The man at the fore-tack lets go the fore-bowline.

The fore-castle men should be divided, to let go the main and main-top bowline, fore-tack and bowline, to brail up the main-top-mast stay-sail, and haul aft the jib, and stay-sail sheets, to raise the fore-tack, and one man to be at the helm and the remainder in the waist.

The fore-top men should be employed at the fore-top-gallant braces, in the top, to bear the backstays aft, at the spritsail braces, and backstay falls, and fore-top-mast-stay-sail sheet, the remainder to be in the waist.

The main-top men are to attend in the top, at the cross-jack braces with the boys at the main, and fore-top-sail braces, main-sheet, and mizen-stay-sail sheet ; in the chains, to keep the main-tack and sheet clear of the guns ; and at the mizen-stay-sail-brails, and backstay-falls.

The mizen-top men are to be in the top, at the mizen-top-sail, and top-gallant braces, and driver-boom. The afterguard and marines at the main and fore braces, and main sheet. The quarter-masters at the conn, main-top-gallant braces, and driver-boom.

The gunners to let go the fore-sheet and main-tack, and to over-haul them on the gangways, to let go the stay-sail sheets, and haul aft the others.

The carpenters, waisters, idlers, and overplus of the forecastle men and fore top, to haul up the clue garnet, and to man the main tack, main, and main-top-bowline, then the fore-bowline, tack, and sheet.

The captain of the afterguard generally stands by the lee main-brace, the captain of the main-top by the main-sheet, the gunner's mate by the main-tack, and the captain of the forecastle by the main-bowline. The ropes are generally bighted down as being more clear for running than when coiled.

REMARKS ON THE NECESSITY OF A FIRE BILL, &c.

We now come to the most important of all the regulations of a ship, namely those which operate against the fatal and shocking effects of fire. The dreadful mischief that a drunken man might create, where, in many cases, no alternative exists between the fury of the flames and that of the ocean, very naturally excites at the moment in which it bursts forth the most violent agitation : And we find, that the example of others, without reflecting on the

consequences of the act, has frequently plunged many unhappy victims into a watery grave, at a time when, by a proper degree of coolness and caution, their lives might have been preserved, and the flames overcome.

To reflect on the event, and consult the best means of providing against it, appear to be the most likely means of preparing the minds of men to receive the shock of an alarm undaunted. This, admitted, will show the propriety and necessity of having a FIRE-BILL: for, whatever good results from stationing people in ordinary cases, cannot be put in competition with this, which provides against the most dreadful catastrophe incident to a ship.

In ships that have established regulations for guarding against this event, whenever it may unfortunately happen, the people naturally fly on the signal of alarm to their posts, and employ themselves eagerly to extinguish the flames; but, how widely different is the confusion, when such a circumstance has been kept out of the contemplation of men's minds: then, timid and confused, one man follows another, and the place of danger is perhaps abandoned whilst that of unconcern is crowded with idle spectators.

Firemen are under the command of the third lieutenant: they are always to have their fire-buckets kept in good order and hung in their places, as also near their respective quarters in action. They are to be subdivided into three divisions, as the ships in action may be on fire in several places at once. The first of the subdivisions are to work the engine, and the second and third divisions draw and carry water to the place in their fire-buckets. On coming into action in the night, they are to get the fighting-lanterns from the officer who distributes them, and hang them against the side immediately over the port, and when exercise or action is over, return them.

From the number of unfortunate accidents which happened during the last war, we surely ought to be prepared to our utmost for such an event; first, by internal precautions, and secondly by the means of exerting ourselves against the danger. Exercising the people at their stations, as shown by the annexed fire-bill, appears to be as necessary as teaching men to reef topsails by practising on the mizen-top-sail yard before they are sent to either of the other stations; and every manœuvre should be taught that is likely to happen in a case of reality. In ships that have not a fire-bill, when fire is discovered, the usual mode is to beat to quarters, that it may detach their minds from viewing the danger, and prevent them from leaping overboard. We shall now show the proportions for a fire-bill for all rates, with an explanation, but the executive officer must arrange and put it in force according to the size and circumstances of the ship.

TABLE VIII.—PROPORTIONS FOR STATIONING THE SHIP'S COMPANY IN CASES OF FIRE.

The ship being on fire, the bell is to be rung as an alarm, (which is to be avoided on every other occasion) the officers and men are to repair to their respective stations, and execute such orders as they may receive for extinguishing it.

Class of Ships.	At the Cistern-pump.	To man the Runners or Stays at the		Draw Water on the		To hand Water from					Party with the				
		Fore Hatchway.	Main Hatchway.	Starboard Gangway.	Larboard Gangway.	Cistern-pump.	Starboard Gangway.	Larboard Gangway.	Hatchways to below.	In the Store-rooms & Passages.	To work the Engine.	Master.	Boatswain.	Carpenter.
100	10	85	86	30	30	27	46	52	30	12	46	30	13	
90	10	77	77	30	30	20	35	36	52	30	12	40	28	11
80	10	70	70	30	30	20	35	36	52	23	12	43	31	8
large 74	10	55	54	26	26	26	30	31	52	23	12	38	31	8
small 74	8	50	50	20	20	16	26	27	48	23	10	35	28	8
64	6	43	43	16	16	14	24	24	36	17	8	25	20	8
50	6	29	20	14	14	14	14	14	26	13	6	20	17	6
44	6	26	26	14	14	16	16	16	22	11	6	20	15	5
38	6	26	27	10	10	12	12	12	16	10	6	15	11	5
large 32	4	20	20	10	10	10	12	12	12	9	6	13	10	5
small 32	4	10	10	8	8	8	8	8	8	8	6	12	8	5
28	4	12	12	8	8	9	9	9	8	8	6	11	8	4
24	4	12	12	6	6	7	7	7	7	7	6	10	7	4
20	4	11	11	6	6	5	5	5	5	6	—	8	6	4
18	3	5	5	5	5	4	4	4	4	5	—	7	5	2

EXPLANATION OF THE FIRE-BILL.

The forecastle-men and quarter-masters are to be divided under the command of the master and boatswain. The former is, with his party, to be employed in removing any stores, &c. to which the fire may be likely to communicate. The latter is, with his party, to collect wet hammocks, sails, &c. to smother it. The gunner, with his crew, to be employed in the store-room, in removing stores and extinguishing the fire there. The top men, in line of battle ships and frigates, on the gangways, drawing water, (which should be emptied into tubs, for the purpose of being handed from thence) at the cistern pump, and to work the engine. The remainder to assist the afterguard, in passing it along, and returning the empty buckets. The waisters, and some part of the afterguard, at the fore and main hatchways, to hoist any thing up from below which it may be necessary to remove. The carpenter and all his crew to attend with their tools, to be ready to perform any service which the exigency of the case may require, and the marines should be divided round the ship with loaded muskets and fixed bayonets, to prevent any person from leaping overboard.

N. B.—Care should be taken, upon the discovery of fire, to prevent any air getting to it. The ports should be lowered, and the gratings laid on with tarpaulins over them; oatmeal has been found a very good thing to smother fire, as well as wet swabs, hammocks, and sails.

PURSER'S DUTY.

The purser being the officer appointed to receive and distribute the victualling stores and slops of the ship, having entered into bonds to the United States, as prescribed by law, is to abide by the following regulations and instructions ; and he is not to expect that any irregularity in, or omission of, any part thereof, or of the forms referred to therein for keeping his accounts, will pass unnoticed.

1. Every purser attached to a vessel of war shall make, to the secretary of the navy, a statement of his accounts every three months, and settle his accounts at the treasury every twelve months; nor shall he permit a longer time to elapse without offering his accounts for settlement, if the vessel to which he belongs be in the United States. And in the event of his failing to do so, his pay and emoluments shall cease from the time of the expiration of the twelve months, commencing at the time of his joining the vessel, or at the date of the last settlement.

2. Every purser of a yard shall settle his accounts at the treasury every twelve months ; nor shall he permit a longer time to elapse without offering his accounts for settlement ; and in the event of his so doing, his pay and emoluments shall cease from the time of the expiration of the twelve months, commencing at the time of joining the station, or at the date of the last settlement.

3. No purser can be employed, or removed from one ship or station to another, until he shall have settled up his accounts for the ship or station to which he shall have last belonged, unless specially exempted from doing so by the secretary of the navy.

4. Before a purser can receive orders to join a ship or station, or to be removed from one ship or station to another, he must produce a certificate from the fourth auditor of the treasury, or other satisfactory evidence, that he has settled up his accounts for the last ship or station to which he belonged, and that the balance against him does not exceed 1000 dollars.

5. When a purser joins a ship or station, he shall see that it is provided with the necessary articles belonging to his department ; take care that the provisions, victualling stores, and slops are of good quality, and demand a survey on those which may appear damaged or otherwise unfit for the service.

6. Tobacco will be purchased by the United States, and delivered and charged to the purser at cost and charges ; and he will, on the settlement of his accounts, be allowed fifty per cent. on the amount of all tobacco issued : which per centage is to be added to the cost and charges on the article when issued to the crew.

7. On fitting out, there shall be furnished of tobacco a supply equal to the time for which the ship may be victualled, and there will be allowed for each man on board at the rate, per annum, of twenty-four pounds of tobacco.

8. When tobacco shall be received from the navy stores, and there shall be a difficulty in ascertaining precisely the first cost and the charges to which it shall have been subjected, it shall be charged to the men at the current retail price per pound, avoirdupois, which is to be certified by the commanding officer present, and the agent.

9. Every purser, on closing his accounts, shall take care to have the quantities of tobacco remaining, inserted in the surveys, in like manner with other victualling stores. He is also to prepare and deliver in to the fourth auditor of the treasury, accounts of the issues corresponding with the different victuallings of the ship, accompanied by certificates of the captain, of the quantities issued and remaining.

10. The purser is to be charged with the tobacco with which he shall be supplied, according to the actual weight at the time he received it, and he will be charged with all deficiencies at the rate at which it may be delivered to the men. If, however, it shall be made appear, that from any extraordinary circumstances, an unavoidable diminution of weight should have taken place, a reasonable allowance will be made on the settlement of his accounts.

11. All slop clothing will be charged to the purser at the cost and charges, and he is be held accountable for the expenditure.

12. In no case will the purser be credited even for any alleged loss by damage in slops, unless he shows, by regular surveys, signed by three officers, one at least to be commissioned, that the loss has been unavoidably sustained by damage, and not by any neglect or inattention on his part.

13. And as a compensation for the risk and responsibility, the purser shall be authorized to dispose of the slops to the crew at a profit of 10 per cent. but he must, at the end of every cruise, render a regular slop account, showing, by appropriate columns, the quantity of each kind of article received or purchased, and the prices and amount, and from whom, when, and where ; and he shall show the quantity disposed of, and to whom, and at what prices ; so that his slop account may show the articles, prices, and amount, received and disposed of.

14. In issues of slop clothing, the purser shall, in no instance, exceed the quantity per man annually, as stated in the following table, unless he shall be particularly instructed to do so, by the captain or commander, in which case, he is to obtain his written order, explaining the necessity of departing from this rule.

Table, showing the quantity and kind of slops allowed to be issued for the first year, per man ; for the second year, two-thirds of the amount of the list prescribed for the first year's issue to be furnished in such articles of slops as the commander may direct. All articles of wearing apparel, or materials of which wearing apparel is made, to be charged as slops ; nor shall any deviation from the articles enumerated in the list, be issued to the crew, except on extraordinary occasions, and then only by written per-

mission from the secretary of the navy, or by the commander when serving on a foreign station, which document shall be presented before the accounts of the purser shall be passed :

1 pea jacket, to serve two years.
2 blue cloth jackets.
2 do. trousers.
2 white flannel shirts.
2 do. drawers,
2 pair of yarn stockings.
2 black handkerchiefs.
2 duck frocks.
2 do. trousers.
1 do. banyans.
4 pair of shoes.
1 mattress.
2 blankets.
1 hammock.
1 red cloth vest.
2 hats.

15. When, on foreign stations, there shall be a necessity to purchase slops, they are to be procured agreeably to the established uniform of the navy, which, in winter, shall consist of blue jacket and trousers, and red vest, yellow buttons and black hat. In summer, the dress shall be white duck jackets, trousers, and vests ; and on the home station, they will be supplied from the navy stores on requisition, in the same manner as other stores are supplied.

16. The purser will be allowed to sell to the crew, under regulations and restrictions, the articles specified in the subjoined list, viz.

Soap.	Combs.
Tin pots.	Brushes.
Spoons.	Riband.
Bottles of mustard.	Needles.
Pepper.	Thread.
Knives.	

17. They shall not be allowed to issue more per man, annually, than the quantity and number specified in the following table, nor shall there be charged on them a profit exceeding twenty-five per cent. on the first cost and charges :

25 lbs of soap.	4 combs.
3 tin pots.	3 brushes.
3 spoons.	3 yards riband.
2 bottles mustard.	Needles and thread in reasonable quantities.
½ lb. pepper.	
4 knives.	

On the settlement of his accounts at the treasury, he must produce the certificate of the cost and charges of the articles abovementioned, approved by the commander ; and unless that docu-

ment is produced, and the most satisfactory evidence given of the charges against the men for these articles, he is not to receive any per centage on the issues of slops and tobacco : and in the event of any fraud or imposition being practised against any of the men, it shall be the duty of the commander to bring him to trial for the same, without any unavoidable delay.

18. Seamen, destitute of necessaries, may be supplied with slops by an order from the captain, after the vessel has commenced her voyage.

19. None are to receive a second supply until they shall have served full two months, and then not exceeding in amount half their pay.

20. Slops are to be issued out publicly, and in the presence of an officer who is to be appointed by the captain to see the articles delivered to the seamen and others, and the receipts given for the same, which he is also to certify. The captain is not to suffer any one to be supplied with slops, except when absolutely necessary, and he is to oblige those who may be ragged and in want of apparel or bedding, to receive such of these articles as they shall stand in need of.

21. Whenever it shall be found necessary to lend slops from one United States' vessel to another, an order shall previously be obtained from the commanding officer, a duplicate of which, and the receipt of the purser who receives them, stating the quantity and price of every particular kind, must be forwarded to the Board of Navy Commissioners by the first safe opportunity, and the original order preserved by the purser to be produced at the settlement of his accounts, without which he will not be allowed credit for such loan.

22. When any one dies on board, his clothes and other effects may be sold at auction, and the amount, after being charged to the buyer, shall be carried to the credit of the deceased for the benefit of his legal representatives.

23. The purser shall be allowed a commission of five per cent. to be deducted from the amount of the sale of dead men's clothes.

24. Seamen are not allowed to bid for deceased officer's clothes that are above their wear, nor suffered to bid for any effects beyond their real value, nor to purchase more than the wages due them can answer for.

25. No purser shall pay over any balance of wages to an administrator, or executor, without first obtaining an order from the secretary of the navy.

26. No purser shall draw moneys at any time or place, without the approval and signature of his commanding officer.

27. At the end of the cruise, and before the payment of the ship, the purser shall return into store such of the slops and bedding as remain unissued, and forthwith render a just account of all slops and bedding that have from time to time been committed to

his charge. He shall not be allowed credit for slop clothes or bedding returned as unserviceable, unless he produce condemnation of them by survey, together with an affidavit, that the whole of the said returns are the same as received from the United States' navy stores or ships, or on account of the United States; and that there was no neglect on his part, in not having timely issued those which may appear condemned as unserviceable; nor shall he be allowed credit for any unserviceable slops or beds thrown overboard, but he shall cause them to be carefully packed up and preserved, that they may be returned into store; and he is not to receive his wages, nor commissions on tobacco, without a certificate from the store-keeper of slops, that he has delivered into the slop store the said condemned slops and beds.

28. There shall be allowed every person serving on board the vessels of war of the United States, a daily proportion of provisions, as specified in the following table.

TABLE OF THE COMPONENT PARTS OF THE NAVY RATION.

Days of the week.	Pounds of				ozs. of	Half pints of					
	Beef.	Pork.	Flour.	concentrated soup.	Bread.	Peas	Molasses.	Vinegar.	Spirits.		
Sunday	1¼	....	½	¼	14	....	....	....	1		
Monday	....	1	....	....	14	1	....	....	1		
Tuesday	1	....	....	¼	14	....	....	....	1		
Wednesday	....	1	....	....	14	....	....	....	1		
Thursday	1¼	....	½	....	14	....	....	....	1		
Friday	....	....	....	½	14	....	1	....	1		
Saturday	....	1	....	....	14	1	....	1	1		
	3½	3	1	1	98	2	1	1	7		
Beef	3½	....	....	....	....	....	....	....	....	at 8½ cents	29¾
Pork	....	3	....	....	....	....	....	....	....	at 9½ cents	28½
Flour	....	....	1	....	....	....	....	....	....	at 4 cents	4
Concentrated soup	....	....	....	1	....	....	....	....	....	at 25 cents	25
Bread	....	....	....	....	98	....	....	....	....	at 5 cents per lb.	30½
Peas	....	....	....	....	....	2	....	....	....	at 1½ cents	3
Molasses	....	....	....	....	....	....	1	....	....	at 10 cents	10
Vinegar	....	....	....	....	....	....	....	1	....	at 2 cents	2
Spirits	....	....	....	....	....	....	....	....	7	at 6 cents	42
Equal to 25 cents per ration.										Dlls. 1 74½	

The above is intended for the crews of vessels at sea only. Vessels in ordinary and navy yards are supplied agreeably to the old form, by which they are allowed fresh beef.

29. The purser being held accountable for the expenditure, he shall, as far as may be practicable, examine and inspect all provisions offered to the vessel, and none shall be received that are objected to by him, unless they are examined and approved by at least two commissioned officers of the vessel.

30. If, upon a settlement of the purser's provision account, there shall appear a loss or deficiency of more than seven and a half per cent. upon the amount of provisions received, he will be charged with, and held accountable for, such loss or deficiency, exceeding the seven and a half per cent. unless he shows, by regu-

lar surveys, that the loss has been unavoidably sustained by damage or otherwise.

31. In all cases where it may appear to the purser that provisions are damaged or spoiling, it will be his duty to apply to the commanding officer, who will direct a survey by three officers, one of whom at least to be a commission officer.

32. Captains or commanders may shorten the daily allowance of provisions when necessity shall require it, taking due care that each man has credit for his deficiency, that he may be paid for the same.

33. No officer is to draw whole allowance while the ship's company shall be on short allowance.

34. Beef, for the use of the navy, is to be cut into ten pound pieces; pork into eight pound pieces; and every cask must have its contents marked on the head, and the person's name by whom it was furnished agreeable to article 42.

35. If there be a want of pork, the captain may order beef to be issued in the proportion established.

36. If any provisions slip out of the slings, or are damaged through carelessness, the value of them is to be charged against the wages of the offender.

37. When in port, if it can be done conveniently, at a reasonable rate, the crew shall be supplied two days in each week with fresh meat, one day in lieu of salt beef, and the other in lieu of salt pork; and it is to be observed that one pound and a half of fresh meat is considered equal to one pound of salt beef, or three quarters of a pound of salt pork; and the amount of the vegetables, greens, and thickening for the soup, is to be equal to the amount of the articles which may, on the day of issue, be stopped in consequence of the serving out of fresh meat.

38. As all are to be equal in point of victualling, no officer or other person is, on any account, to select provisions for his own use, either on shore, in store, or on board ship. Nor are they to be paid in kind for any savings of provisions, or to draw more of any one article than is allowed by the established ration. The ship's provisions are calculated and intended for daily subsistence, and must be issued agreeably to this intention.

39. Provisions and stores purchased by agents are to be surveyed when received on board, and if it should appear by the report of the surveying officers, that they are unfit for the public service, they are to be returned to the agent; and, on settlement, the captain is to refuse to admit them into the agent's account against the ship, and is to transmit to the board of navy commissioners a duplicate of the report of survey, with such remarks as the case may make necessary.

40. Provisions and stores unfit for service are, after survey, if in a port of the United States, to be returned into the navy stores, or to the navy agent, to be disposed of at public sale, to the best advantage; if in a foreign port, they are, by order of the commander or captain, to be sold by the purser, or such other person

as the commander or captain may appoint; and if at sea, or in a situation where they cannot be otherwise disposed of, they are to be thrown overboard. But in either case, the purser or officer having charge of the stores is to preserve a copy of the survey, with a certificate of the manner in which the articles were disposed of; otherwise such purser or other person will not be allowed credit for the amount thereof.

41. Provisions and stores, especially on foreign voyages, are to be often examined by order of the captain, and every necessary measure adopted for their preservation.

42. Every cask and package of provisions, wet or dry, bread excepted, sent on board the United States' ships of war, is to have the contents thereof, as to quantity and kind, distinctly marked on it, together with a number, and the time when, place where, and by whom, purchased or furnished. The casks are to be marked on the head, and the packages on some proper or conspicuous part of them.

43. The casks for spirits are to be stowed in the spirit room, to be surveyed by a sworn gauger, and the quantity they will contain, in gallons, (wine measure,) is to be marked plainly on each, near the bung. Casks, in which liquor of any kind is brought on board, are also in like manner to be gauged, and the contents marked on them.

44. In all cases when fresh meat is received on board, the commander is to see that it is good and wholesome; that it is fairly and equally distributed among the officers and crew, that no particular pieces are reserved for the officers or others, that a lieutenant, master's mate, or midshipman, attend the distribution in some public and convenient part of the ship, where it shall be pricked for in the customary manner.

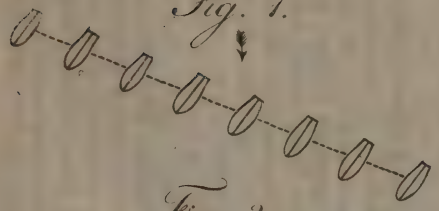
NOTE BY THE COMPILER.

We have wholly omitted the subject of MARINE TELEGRAPHS, referring our patrons to that invaluable work, the UNIVERSAL SIGNAL BOOK, published by JAMES M. ELFORD, teacher of Navigation and Nautical Astronomy, Charleston, (S. C.) which is "so composed, as to enable vessels at sea, provided with only two sets of the six telegraphic flags, described in a plate, to make 7569 signals, (1387 of which are particularly specified in the book for the merchant service), and to act as telegraphs to each other, which may be used by every nation, and understood by all without difficulty or complexity." [This work is for sale by WILLIAM HOOKER and EDMUND and GEORGE W. BLUNT, New-York, and all respectable CHART SELLERS in the United States.]

NAVAL-TACTICS.

Plate 1.

Fig. 1.



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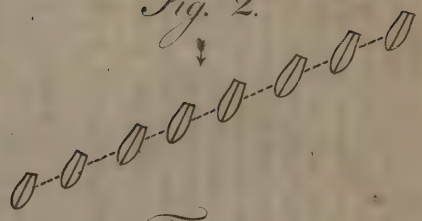

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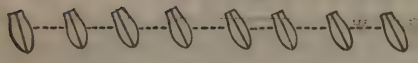

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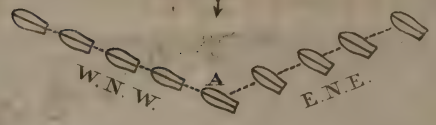

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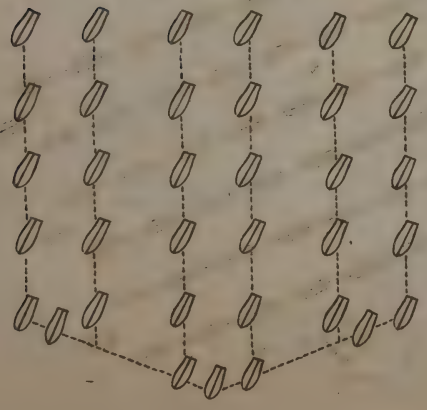

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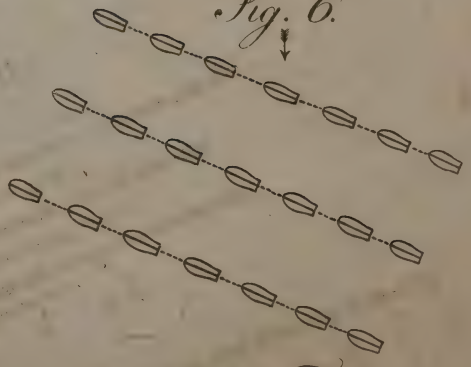

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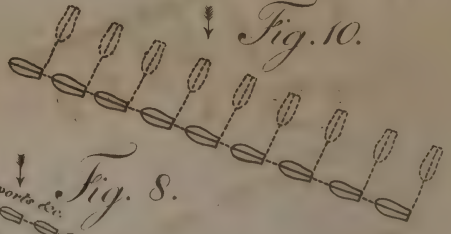

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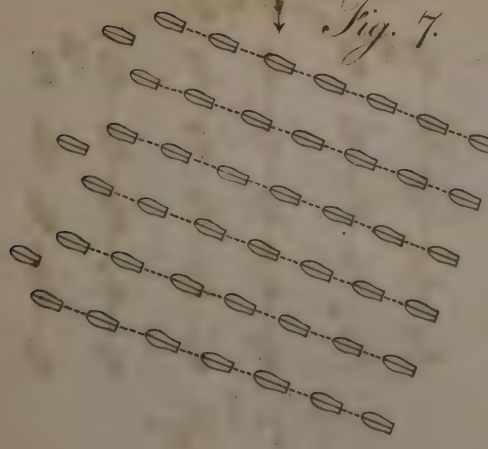

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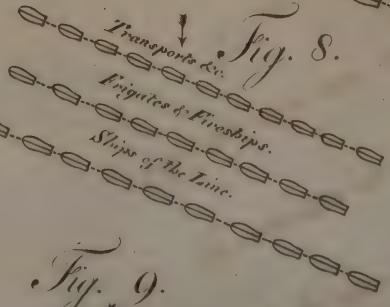
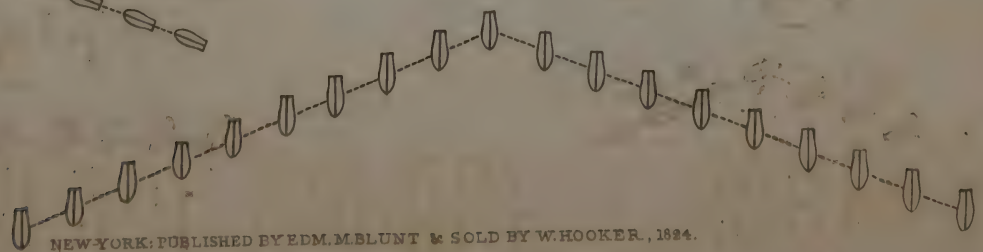


Fig. 9.



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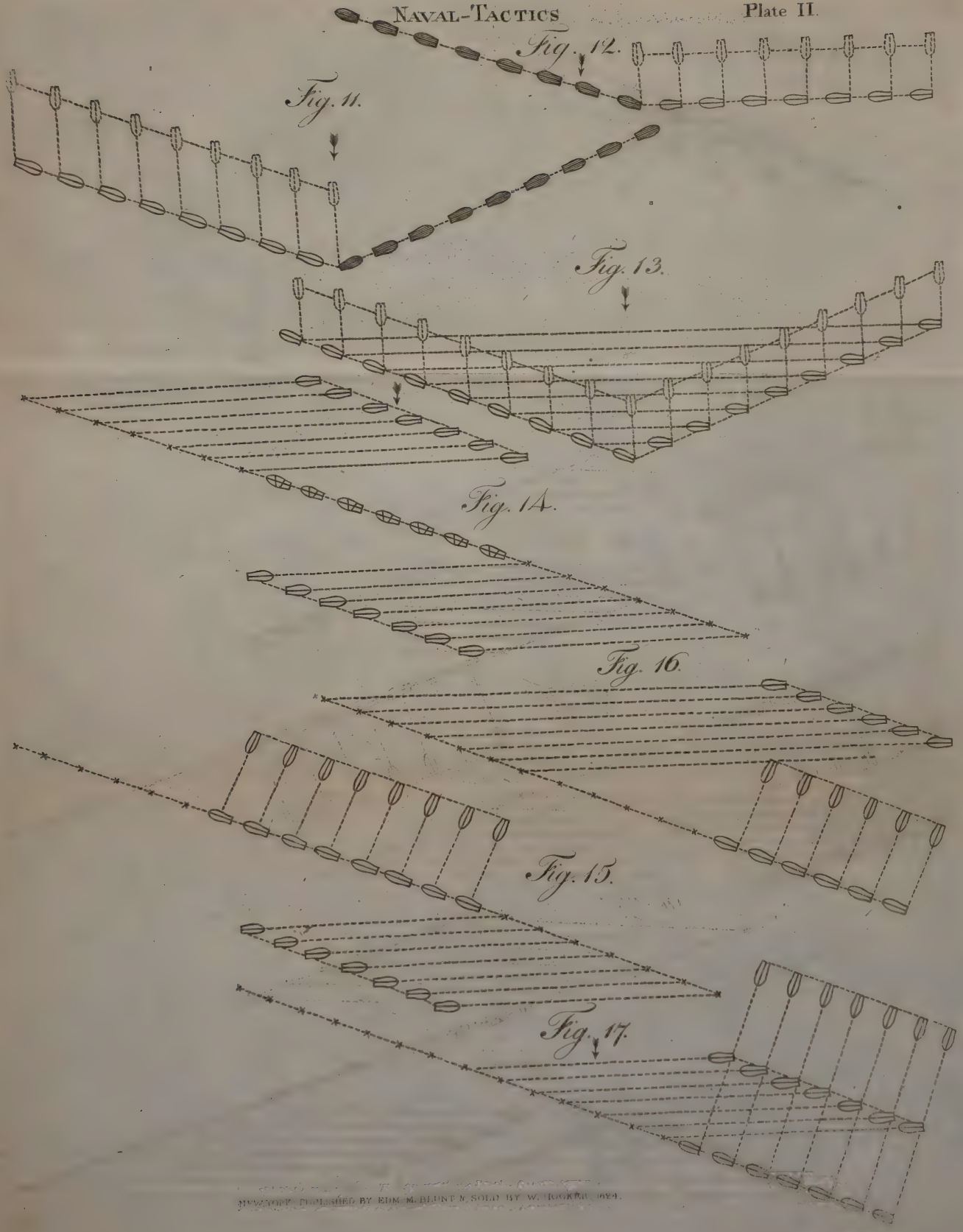

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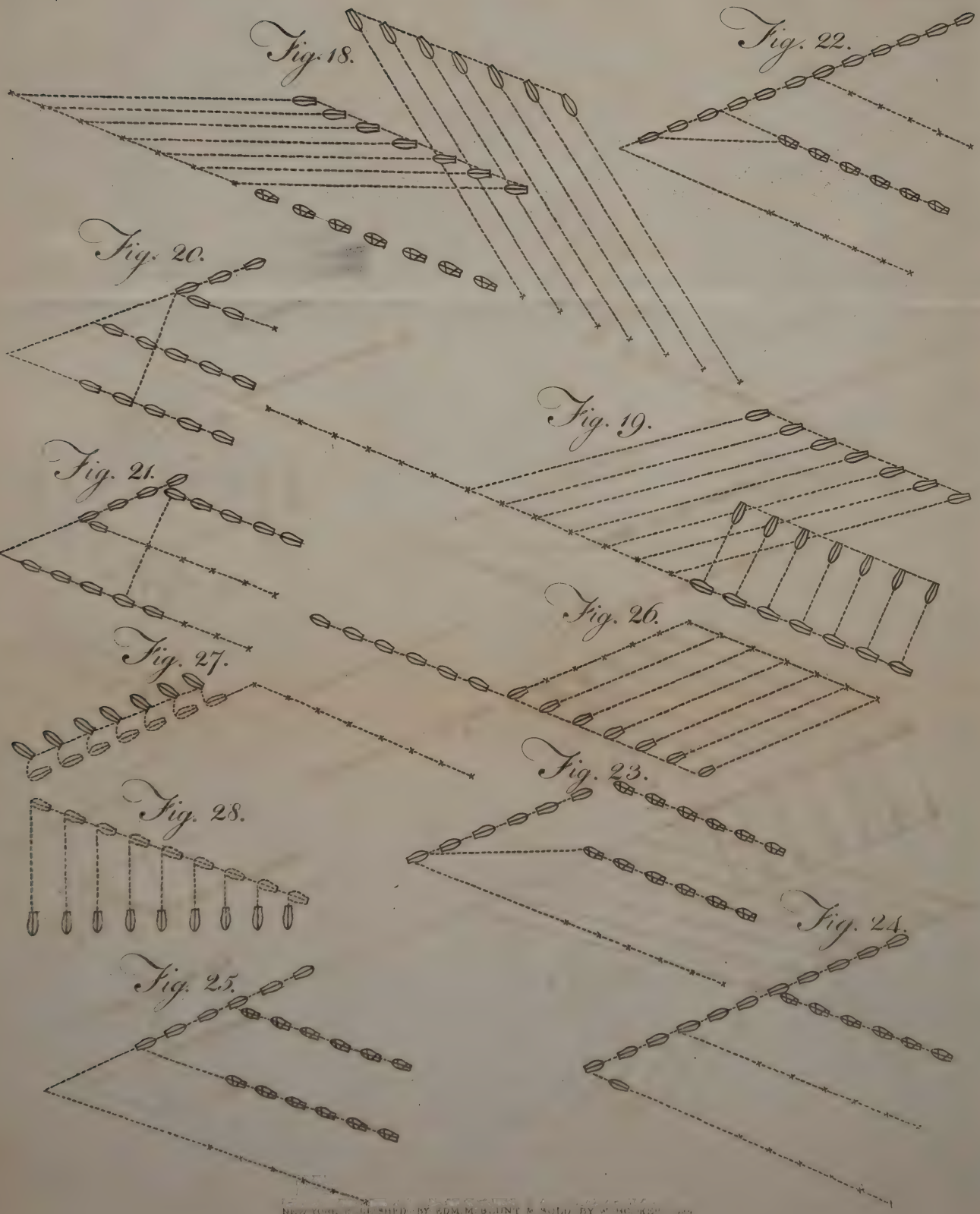

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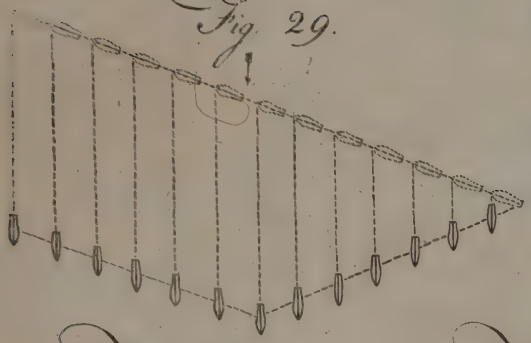
Fig. 29.



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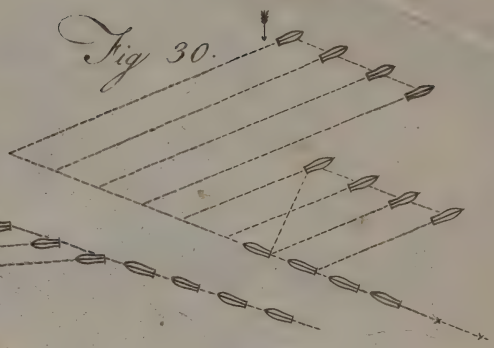

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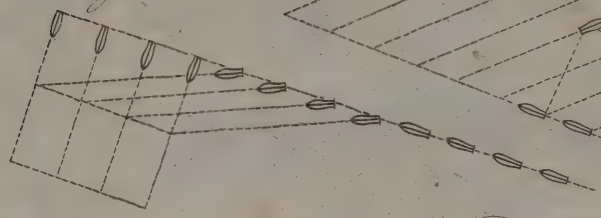

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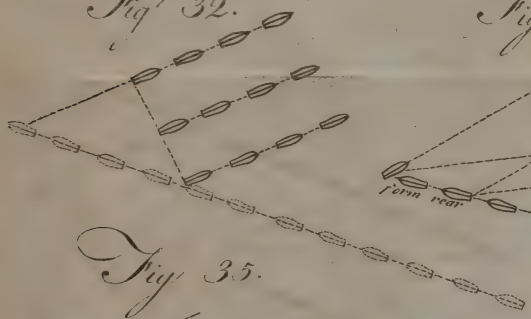

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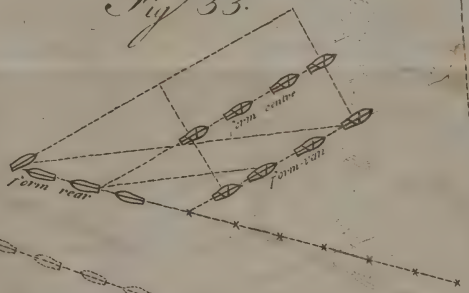

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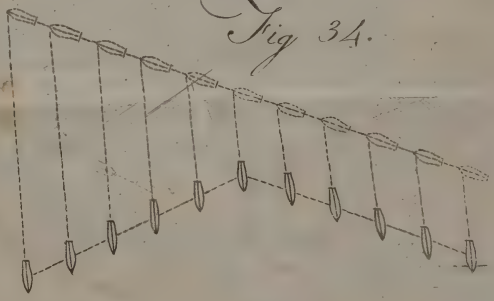

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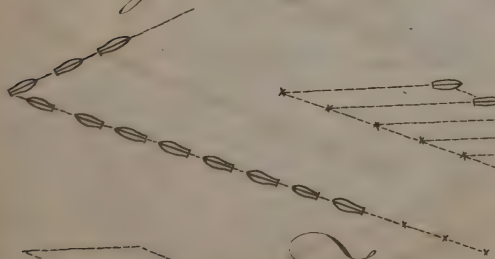

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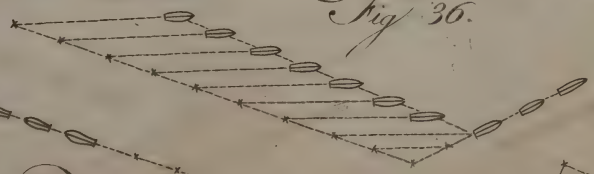
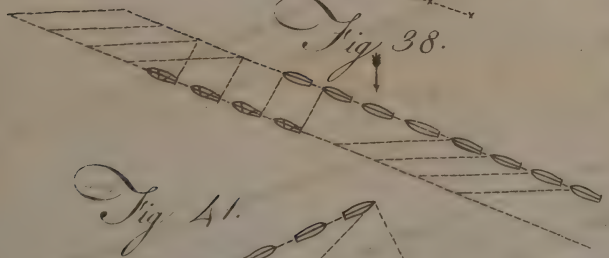


Fig 37.

Fig 38.



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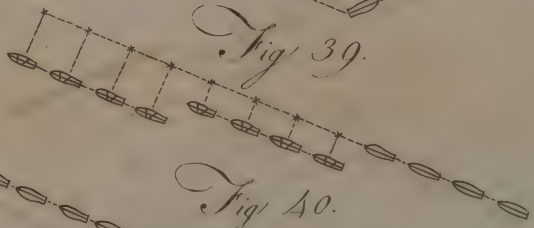

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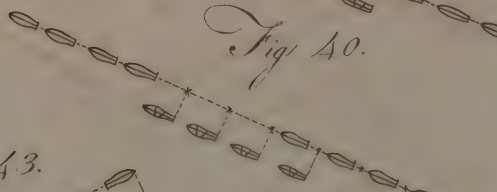

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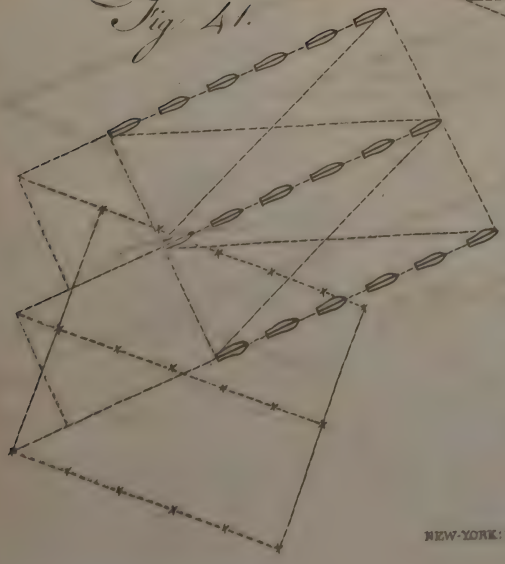

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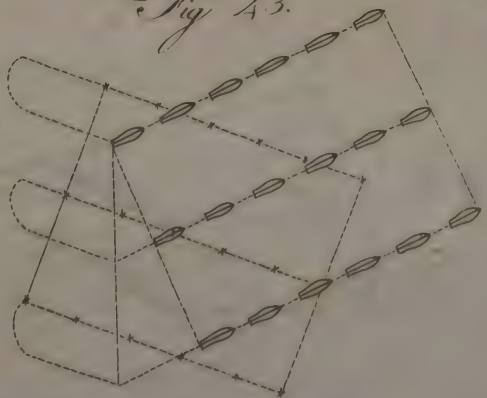

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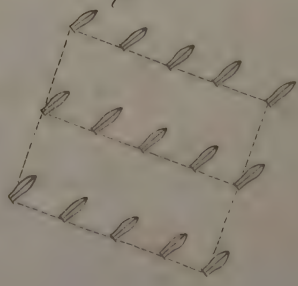

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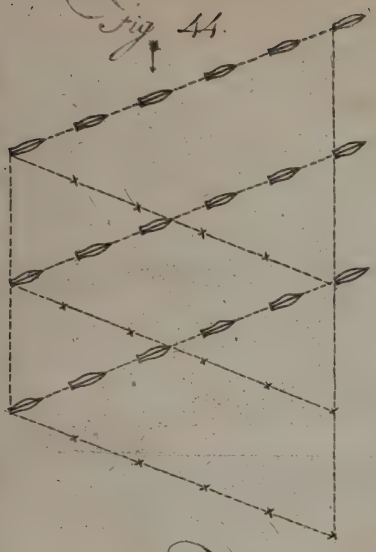
Fig 44.



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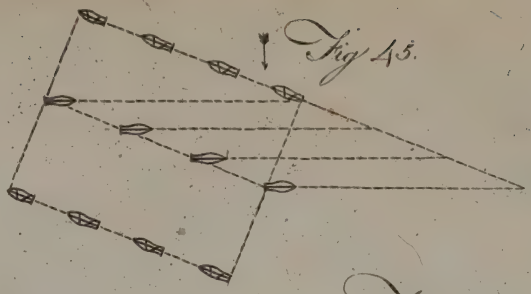

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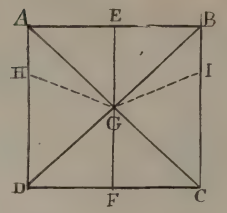

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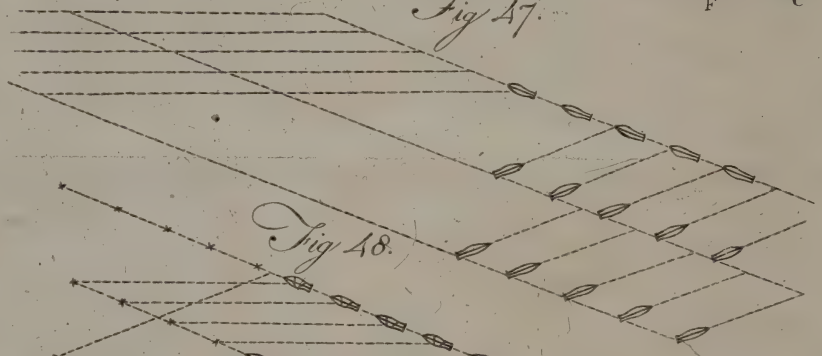

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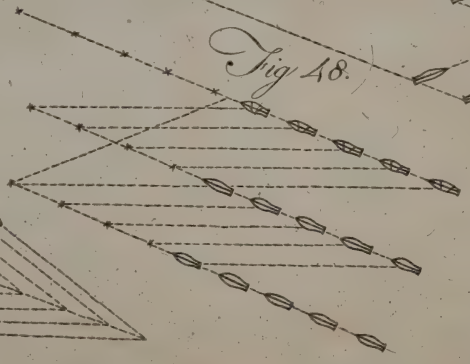

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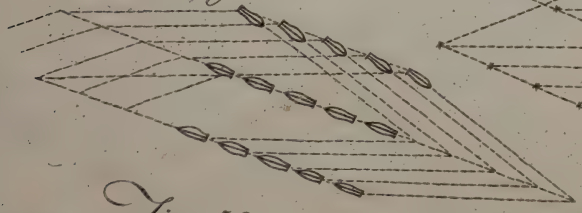

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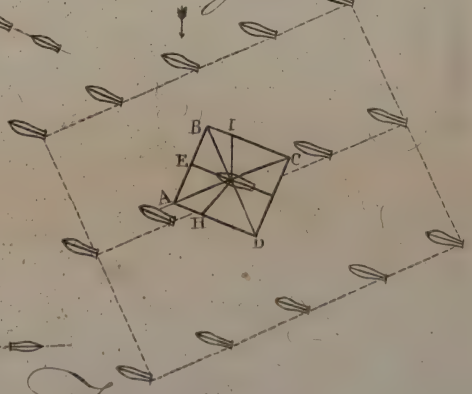

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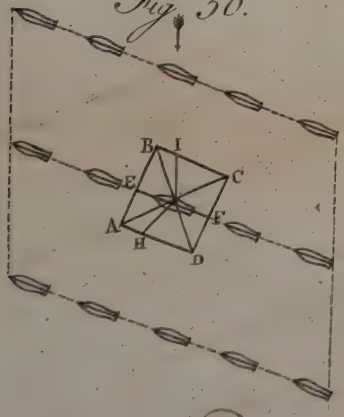

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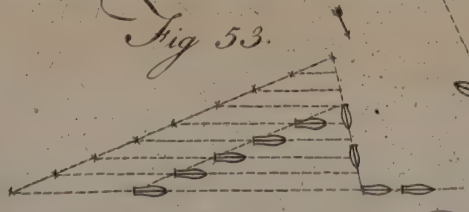

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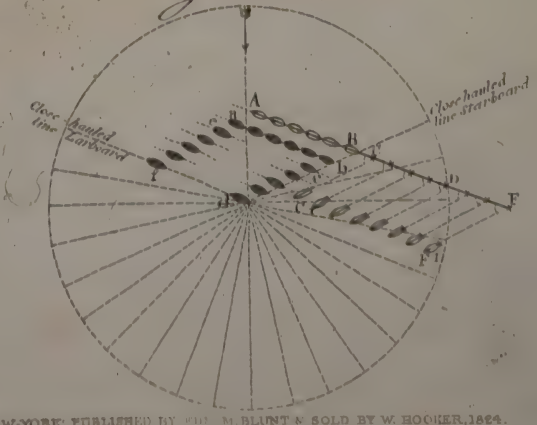

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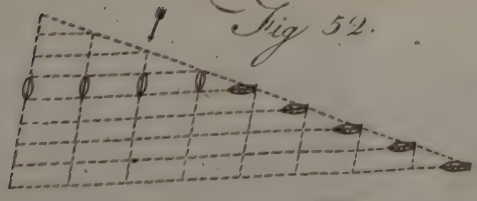

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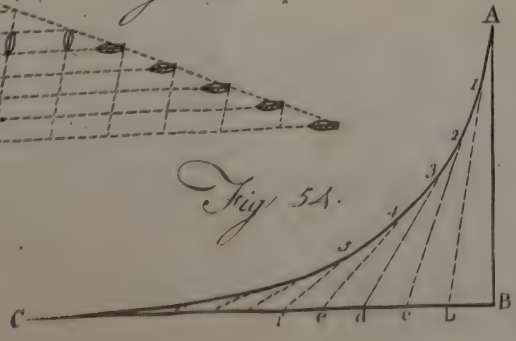

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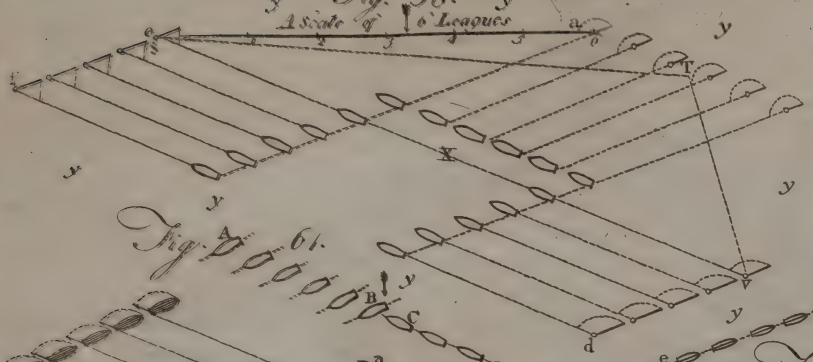

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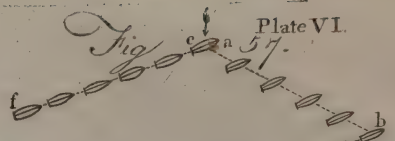

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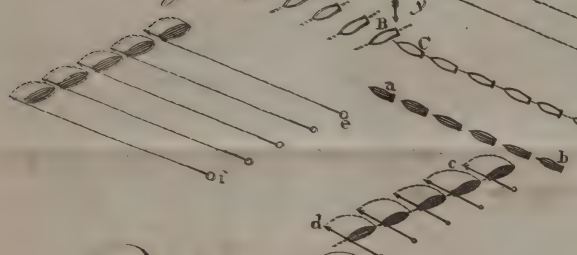

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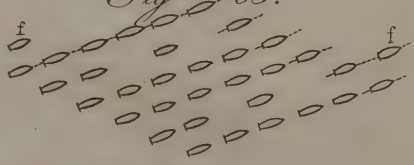

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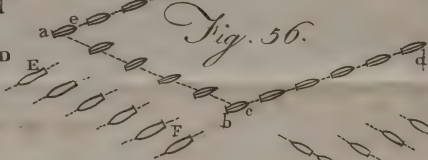

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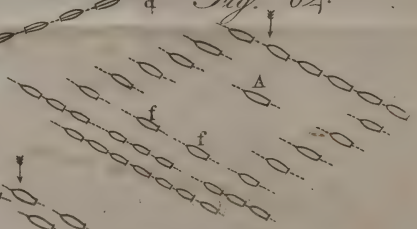
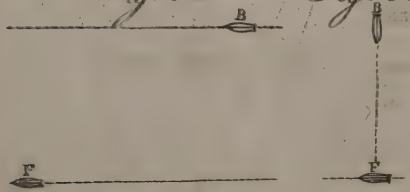


Fig. 65.

Fig. 66.



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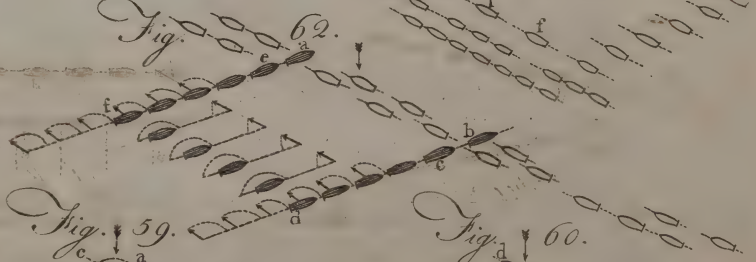

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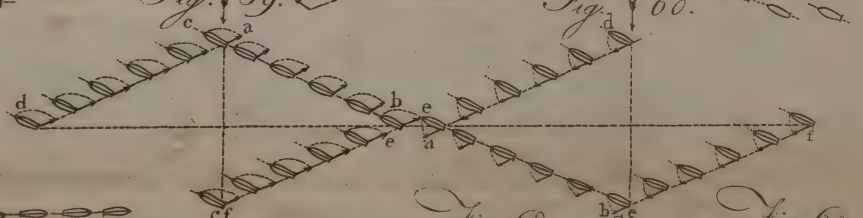

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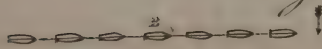

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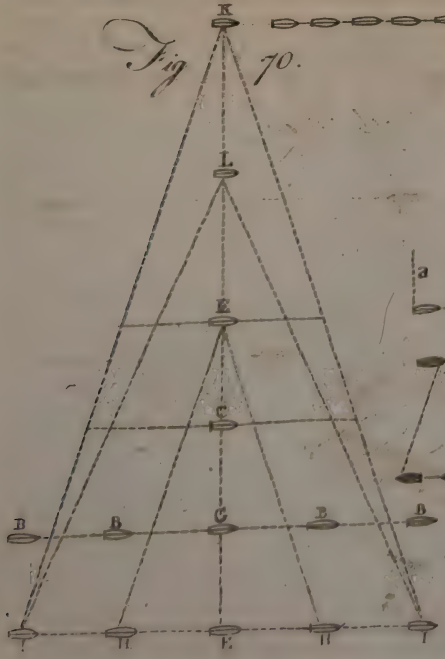

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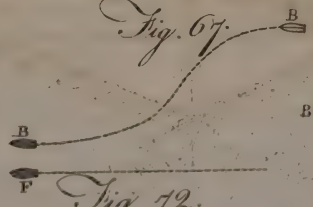

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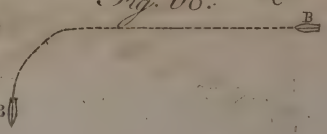

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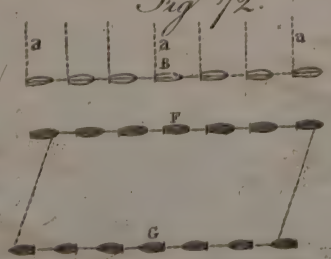
Fig. 72.



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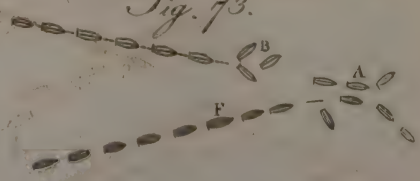

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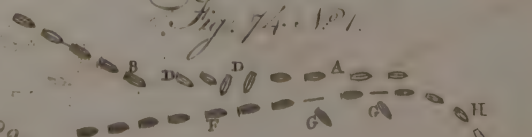

Fig. 74. N°2.

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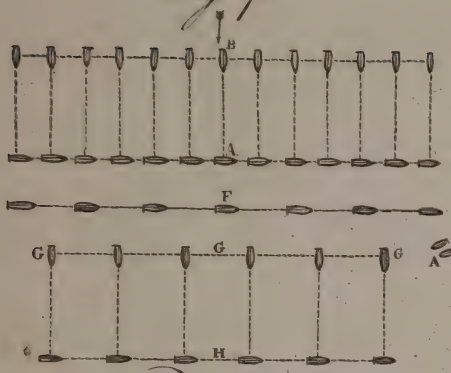
Fig 75.



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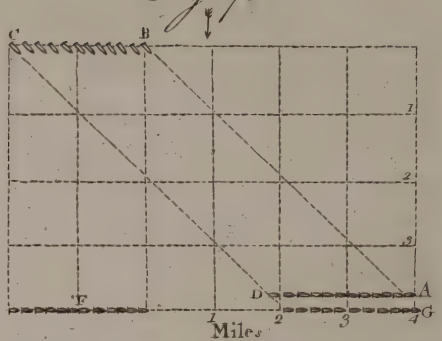

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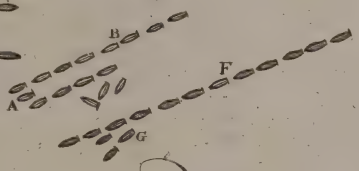

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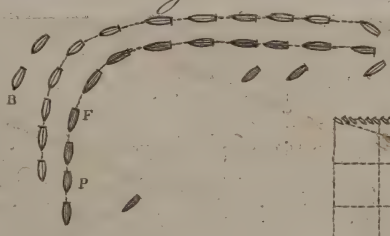

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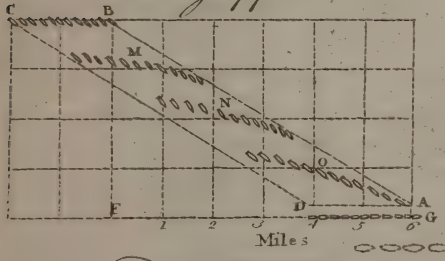

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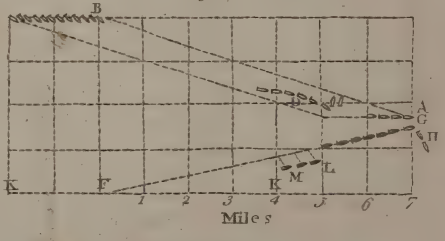

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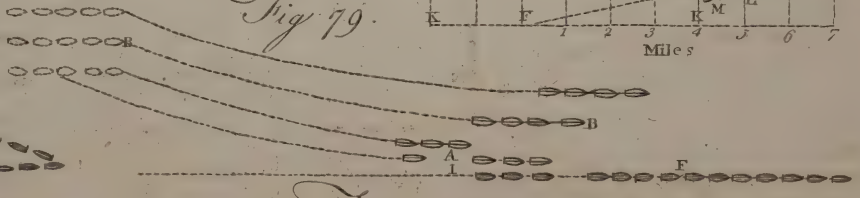

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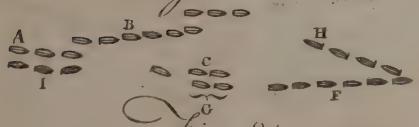
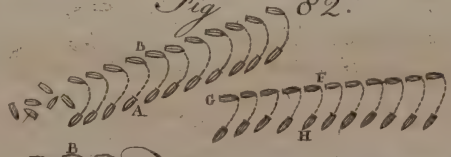


Fig 81.

Fig 82.



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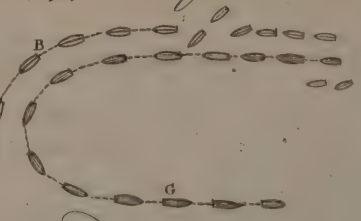


Fig 83.

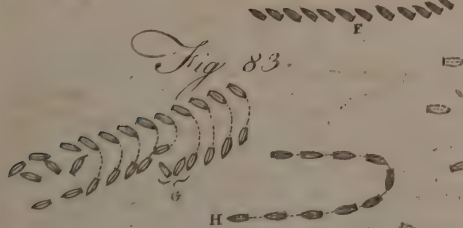


Fig 88.

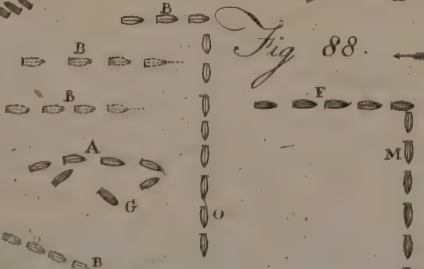


Fig 89.

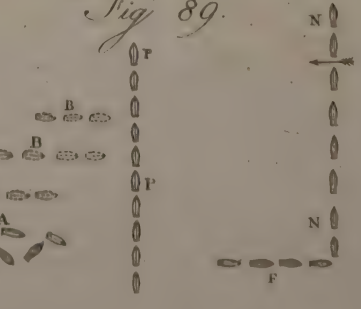


Fig 87.

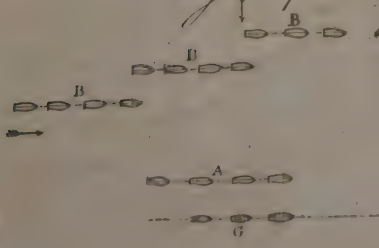
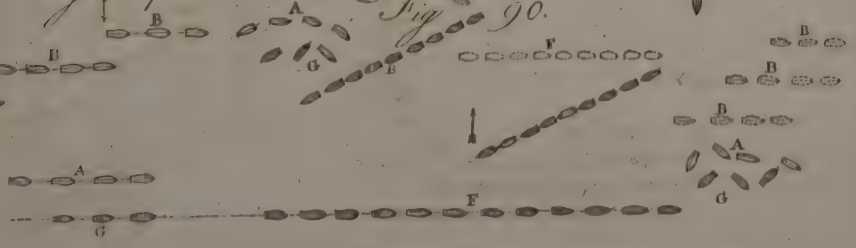


Fig 90.



NEW-YORK: PUBLISHED BY EDM. M. BLUNT & SOLD BY W. HOOKER. 1824.

JUST PUBLISHED,

By H. C. Carey and I. Lea,

Corner of Fourth and Chesnut Streets, Philadelphia,

AND FOR SALE BY THEM, AND BY

W. HOOKER,

No. 202, WATER STREET, NEW YORK,

THE

YOUNG SEA OFFICER'S

SHEET ANCHOR,

Or a KEY to the LEADING of RIGGING and to PRACTICAL SEAMANSHIP. By Darcy Lever, Esq. With an Appendix, containing several figures illustrative of novelties and improvements in Rigging, &c. In one volume quarto, illustrated by 115 Engravings. Price 13 dollars bound.

"The nautical Work, called 'Lever's Sheet Anchor,' which it is the intention of Messrs. Carey & Sons, of Philadelphia, to republish, I consider as a valuable work for seamen, and accordingly recommend it to the Young Officers of the United States' Navy.

"Boston, 29th August, 1823. W. BAINBRIDGE."

The following Officers of His Britannic Majesty's Navy have signed a recommendation of this work.

Keith, Admiral.
Geo. Montague, Admiral.
Wm. Young, Admiral.
Philip Patton, Admiral.
J. Halloway, Vice Admiral.
E. Gower, Vice Admiral.
B. S. Rowley, Vice Admiral.
H. E. Stanhope, Vice Admiral.
C. P Hamilton, Vice Admiral.
Isaac Coffin, Rear Admiral.
J. Vashon, Rear Admiral.
Robert Jackson, Capt. H. M. S. Edgar.
E. W. C. R. Owen, Capt. H. M. S. Clyde.
John Laugharne, Capt. H. M. S. Isis.
Joshua Sydney Horton, Captain H. M. S. Princess of Orange.
Henry Bazely, Capt. H. M. S. Antelope.
A. C. Dickson, Capt. H. M. S. Orion.
Charles Elkins, Capt. H. M. S. Defence.
George Grey, Captain Royal Navy.
Thomas Dundas, Capt. Royal Navy.
Loftus Otway Bland, Capt. Royal Navy
Walter Lock, Capt. Royal Navy.
P. Somerville, Capt. H. M. S. Nemesis.
Joseph Larcom, Capt. Royal Navy.
Charles Adam, Capt. H. M. S. Resistance.
R. Moorsom, Capt. Royal Navy.
D. H. Mackay, Capt. Royal Navy.

The following Testimonials were also given by Gentlemen of known experience in the Merchant Service.

We, the undersigned, have examined Mr. Lever's Demonstration of Rigging and Seamanship. The explanation throughout is so judiciously managed by the introduction of numerous figures, that it may be justly styled a Key to the Art. We are therefore of opinion, that it is a work which promises to be of national utility, and every way suited to forward the Author's design, who has in this Treatise opened an easy channel for the improvement of young Sea Officers in every service :

Caleb Fletcher,	Jacob Fletcher,	George Brown,	Liverpool.
James Finchett,	William Ward,	Richard Hall,	
Roger Leatham,	Robert Bibby,		
Joseph Fletcher,	Hamlet Mullion,		

From the Monthly Review.

"We think that this work merits the highest praise that has hitherto been bestowed on any treatise, of which the professed object was the instruction of young officers in the various branches of Marine service. To practical seamen it may be considered a useless study : but even with respect to them, many suggestions of a scientific nature here occur which are not unworthy of their attention : particularly in page 84 on a 'ship's griping,' and in page 99 on 'drifting,' with many others equally judicious.

"The perspicuity with which every topic is treated and illustrated, by the plates, (which are superior to any hitherto published on this subject,) renders the work very beneficial to youth ; who, by studying the theory in most of its branches, will more readily acquire the practice, than by remaining ignorant of causes which are so ably explained in the present volume. The principle of working ships is made intelligible to the meanest capacity. Most of the topics here introduced, as Mr. Lever observes, have been treated before in various ways, but by no means with such precision, nor elucidated by such figures as the present work exhibits. His management of a ship in light winds, when missing stays, in working in bad weather, and in tending at single anchor, cannot fail to contribute much to the improvement of youth : and his able discourse on the latter operation, is by no means the least meritorious part of the volume.

"We can recommend Mr. Lever's work as containing nothing that is superfluous and all things that are useful on the subject which it treats."

From the British Critic.

"We dismiss the present Article by heartily concurring with those gallant and noble Officers who have expressed their approbation of the work, and have recommended it to the study of the profession."

From the Anti-Jacobin Review.

"This is certainly the most complete representation of all the mechanical operations of Seamanship, which has yet appeared. The author has accurately delineated in one hundred and eleven large quarto plates, containing five hundred and eighty-seven figures, all the different parts of the rigging, the various positions of the ship, sails, shrouds, masts, yards, tackles, Ropes, cables, anchors, buoy, compass, &c. &c. with ample directions for splicing ropes, making sails, &c. The engravings are neatly executed, and are very creditable to the talents of *Messrs. Butterworth*, of Leeds. This Key to Rigging and Seamanship will also be useful to ship-owners, as well as the young midshipmen of his majesty's navy."

JONATHAN WATERBURY,

MERCHANT TAILOR,

No. 301 Pearl-street, NEW-YORK,

Where Citizens, Officers, and Seamen, may supply themselves on the most satisfactory terms.

Measures taken and executed with neatness and despatch. July, 1824.

RICHARD KAIN'S

Wholesale and Retail

DRY GOOD STORE,

No 109 *William*,

Corner of John-street, New-York,

Who keeps constantly on hand, all sorts of Cloths and Cassimeres, and every thing appertaining to Apparel for Officers of the Navy and Army, which he will sell low for cash.

July, 1824.

Fancy and Windsor Chair Manufactory,

WHOLESALE AND RETAIL.

ASH & WELSH,

No. 33 JOHN-STREET, NEW-YORK,

Have constantly for sale, a very general assortment of Fancy and Windsor CHAIRS, of the newest fashion, and on the most reasonable terms.

All orders punctually attended to, and reasonable allowance made to shippers.

Old Chairs repaired, painted, and regilt. July, 1824.

R. YEO,

No. 165 *WATER-STREET*,

NEW-YORK,

Has prepared, from a receipt of the first Physicians in this state, Leather, from which he makes Shirts of the most vital and nutritive properties, which produce an animal heat to the body, that cannot be obtained from flannel, patent fleecy hosiery, or lamb's wool. This preparation absorbs all the perspiration arising from the skin, opens the pores to emit the morbid humours of the frame, and prevents all those evils arising from the sudden transitions from heat to cold to which our climate is so subject; and which is the great origin of colds, consumptions, rheumatisms, gout, putrid fever, &c. These shirts are soft and pleasant to wear, and do not produce that disagreeable irritation of the skin attendant on the wearing of flannel.

Also, PATENT DRAWERS, which for durability and usefulness are not equalled by any.

Those who have honoured R. Y. with their orders have declared their satisfaction at the benefits derived from their adoption. Indeed, it would require volumes to enumerate all the advantages to be derived from this invaluable discovery.

R. YEO has always on hand, all sorts of Leather Breeches, Pantaloons, Drawers, and Doe-skin Vests, Skins for Drumheads, &c. &c. on the most reasonable terms, at the shortest notice.

N.B. All sorts of Leather Breeches and Gloves cleaned.

Letters from any part of the United States, post paid, will be attended to.

July, 1824.

GEORGE B. ALVORD.

No. 24 Bowery,

NEW-YORK,

Respectfully informs his friends and the public, that he has lately opened a store at the above place, and has constantly on hand, a general assortment of Men's, Youths', and Boys'

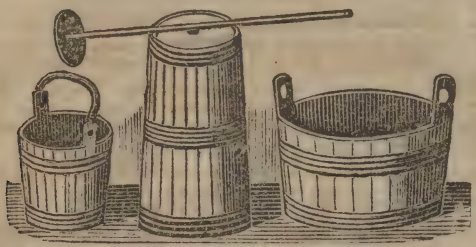
HATS,

At reduced prices, viz.—long napt ovals for 3 dollars, which he particularly recommends, warranted water-proof. Also, 4 dollar hats, equal in elegance and durability to any 5 dollar hat.

Light Beaver and Castors, from 5 to 7 dollars. Youths' and Boys' water-proof Hats, $1 50 to $2. Men's second quality Oval Hats, from $2 to $2 50. Children's Fancy Hats, Boys' Wool Hats, &c.

The above hats are made of the best materials, got up and trimmed in the most elegant style, and are warranted to retain their colour.

All orders attended to with punctuality and despatch. July, 1824.



CEDAR WARE MANUFACTORY.

THOMAS S. HUNT,

No. 286 Greenwich-street, one door north of Chamber-street,

NEW-YORK,

Still continues to manufacture Brass, Iron, and Wood-bound Tubs, Pails, Coolers, Churns, Bathing Tubs, &c.

Wholesale and Retail.

Also for sale, willow cradles and waggons, ladies' fancy willow baskets, willow market baskets with and without covers, bottle baskets, wooden bowls, bread trays, tubs, pails, brooms and brushes of all kinds, door mats, milk and butter pails, clothes lines, shovels, &c. &c. July, 1824.

E. W. WALGROVE,

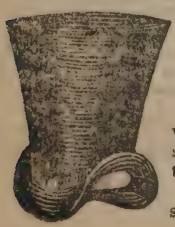
MERCHANT TAILOR,

Begs leave to inform his friends and the public in general, that he has removed to

No. 6 Wall-street, New-York,

Where he will be ready to execute and order in the line of his profession.

Navy and Military Officers furnished in the most fashionable style. July, 1824.



H. Spendlove & Co.

HAT MANUFACTURERS,

No. 77 Maiden-Lane, New-York,

Have constantly on hand, an extensive assortment of Men's Beaver, Castor, and Roram water-proof HATS, of every variety and shape. Also, Youths' and Boys' Hats—Children's fancy Hats, which they offer, Wholesale or Retail, on the most reasonable terms.

P.S. Wool Hats, assorted, with an assortment of low-priced Hats, suitable for the southern market.

July, 1824.

MANSION HOUSE HOTEL,

South Third-street, Philadelphia.

CHESTER BAILEY has the honour to inform the public, that he has taken this spacious establishment, which has been rebuilt, and is now furnished in the most genteel style. The beds and bedding are entirely new, and the mattresses were purchased of Mr. Jackson of New-York, who is acknowledged to stand first as manufacturer of that article. The superior advantages of this house are too well known to be named, having a very spacious dining-room, with reading and other rooms on the first floor, and five splendid parlours, beautifully furnished, with bed-rooms adjoining, particularly suited to the accommodation of families; added to which are between forty and fifty single bed-rooms, each of which has a fire-place and bell.

The Mail and Citizens Coaches for New-York, and Mail for Baltimore, run to and from this Hotel, and the proprietor intends to keep a first-rate house for comfort, convenience, and taste, and hopes to receive such a share of patronage from the citizens of Philadelphia and the public, as they may think he merits. May 1824.

MERCHANT TAILORS.

ALEXANDER DOUGHERTY & SON, Merchant Tailors, 39 SOUTH FRONT-STREET, *PHILADELPHIA*, have for sale a variety of

CLOTHING OF FIRST QUALITY.

*** Navy and Army Officers may supply themselves on the most reasonable terms, and with the newest fashions. May 1824.

CLOTHING STORE.

ALEXANDER DOUGHERTY & SON, Tailors, No. 40 South Water-street, *PHILADELPAIA*, have constantly on hand, a regular and extensive assortment of CLOTHING, where Officers and Seamen may supply themselves on the most satisfactory terms. May 1824.

J. M. ELFORD'S

CHART AND MATHEMATICAL STORE,

No. 119 East Bay, sign of the Quadrant, Charleston, S. C.

OLD ESTABLISHED STAND.

For sale, Charts, Nautical Books, and Mathematical Instruments of every description. Compasses, Quadrants, Spy-Glasses, &c. repaired and for sale. Chronometers rated.

Published and for sale, J. M. Elford's *Longitude Tables*, being the shortest and most simple method of working Lunar Observations of any in practice. Elford's Circular *Polar Tables*, for finding the Latitude at any time of night by an altitude of the Polar Star. Elford's Universal and Perpetual Circular *Tide Table*, for finding the time of High Water every day in the year, at all the principal places in the world, by inspection or at sight. Also, the Universal Signal Book, with improvements, by J. M. Elford.

☞ NAVIGATION taught in all its branches, including Astronomical and Lunar Observations.

N.B. An *Evening School* from 6 till 9—and private lessons given upon Lunar Observations at intervals. May 1824.

To Stationers, Booksellers, and Druggists.

Extra fine, superfine, and fine red and black Sealing Wax
Japan liquid black and red Ink — Black and red Ink Powders
Indellible Ink — Court Plaster
Soda, Seidlitz, and Rochelle Powders, in boxes, will keep in all climates
Salt of Lemons — Lemon Acid
Cepholic Snuff — Black Varnish, and
Pomatum. The above articles are manufactured by

WILLIAM KIDDER,

And kept constantly for sale at his Store, No. 31 BOWERY, next door to the Corner of Bayard-street, NEW-YORK.

Wm. Kidder takes this method of expressing his gratitude to the citizens of New-York, and most other cities and towns in the United States for the fostering patronage they have afforded him for the past five years, and solicits a continuance of their favours. He is determined that every article of his making shall be of the best quality, and trusts that his long experience will warrant him in recommending them to be equal to any that can be made. May 1824.

WILLIAM DAVENPORT,

Mathematical, Optical, and Philosophical Instrument Maker,

No. 25 South Front-street, Philadelphia,

Has constantly on hand a general assortment of Mathematical and Philosophical Instruments, of the best quality, (warranted,) comprising articles of almost every description in the Mathematical line, viz. Sextants of ebony and metal, with silver, brass, and ivory arches; Quadrants, with and without tangent and vertical screws; Day and Night Telescopes, with and without brass shades; and Telescopes of every description; Azimuth, Amplitude, Storm, Brass, and Wood Binnacle, Hanging and Pocket Compasses; Binnacle Lamps; Time Glasses of every quality; Thermometers; Marine Barometers; Scales and Dividers; Parallel Rules; Protracters; Cases Instruments, &c. &c.

A very extensive assortment of the latest and most improved Charts and Pilots for every part of the world, among which are, Blunt's Chart of the Coast of North America, on 10 sheets; do. Western Ocean, extending from the equator to the North Cape; do. Coast of Labrador; do. Newfoundland, and Gulf St. Lawrence; do. Long Island Sound; do. West Indies; do. American Coast Pilot; do. Seamanship, and Naval Tactics; do. Nautical Almanacs; Ship Master's Assistant; together with every Nautical Publication of merit, and a general assortment of Stationary.

Sextants, Quadrants, Compasses, Time Glasses, and other instruments, cleaned and repaired at the shortest notice, and on the most reasonable terms.

May 1824.

R. YEO,

No. 165 *WATER-STREET, NEW-YORK,*

Has prepared from a Receipt of the first Physicians in this State, Leather, from which he makes Shirts of the most vital and nutritive properties, which produces an animal heat to the Body that cannot be obtained from Flannel, Patent Fleecy Hosiery, or Lamb's Wool. This preparation absorbs all the perspiration arising from the skin, opens the pores to emit the morbid humours of the Frame, and prevents all those evils arising from the sudden transition from heat to cold to which our climate is so subject; and which is the great origin of Colds, Consumptions, Rheumatisms, Gout, Putrid Fevers, &c. These shirts are soft and pleasant to wear, and do not produce that disagreeable irritation of the skin attendant on the wear of Flannel.

Also, PATENT DRAWERS, which for durability and usefulness are not equalled by any.

Those who have honoured R. Y. with their orders have declared their satisfaction at the benefit derived from their adoption. Indeed, it would require volumes to enumerate all the advantages to be derived from this invaluable discovery.

R. YEO has always on hand all sorts of Leather Breeches, Pantaloons, Drawers, and Doe-Skin Vests, on the most reasonable terms, at the shortest notice.

N. B. All sorts of Leather Breeches and Gloves cleaned.

Letters from any part of the United States, post paid, will be attended to.

May 1824.

SAND-PAPER AND CARD FACTORY.

CALEB BARTLETT,

Continues to manufacture Glass, Sand, and Emery Paper—also, Blank, Playing, and Visiting Cards, of every description, at his

BOOK-STORE AND CIRCULATING LIBRARY,

No. 78 *Bowery, New-York.*

All orders in his line executed at the shortest notice, and on the most reasonable terms.

C. B. has constantly on hand, for sale, a general assortment of BOOKS and STATIONARY, together with the best editions of the most useful and approved SCHOOL BOOKS, Bibles, Testaments, Geographies, Book-Keeping, Arithmetics, Expositors, Grammars, Spelling-Books, &c. &c. May 1824.

PAPER AND BOOK WAREHOUSE.

R. and W. A. BARTOW, New-York, have constantly for sale, a supply of the best qualities of Medium and Demy Writing Paper; hot-pressed and plain Folio and Quarto Post and Cap, with various kinds of Royal and Medium Printing, on commission, from the principal mills in the United States, at the lowest prices. Orders from the southward will meet with prompt attention.

A very extensive assortment of *BOOKS* and *STATIONARY.* May 1824.

W. B. GILLEY,

BOOKSELLER AND STATIONER.

(WHOLESALE AND RETAIL)

NO. 92 BROADWAY,

New-York.

HAS CONSTANTLY ON HAND, A GENERAL ASSORTMENT OF

School,
Classical,
Theological, and
Miscellaneous
} BOOKS

Blank Books, Quills, Paper, Penknives, and every description of

STATIONARY.

Southern and Country Merchants, Captains of Vessels, &c. supplied on the most favourable terms.

N.B. The *POPULAR WORKS* of the day regularly and promptly received.

BOOKBINDING of every description executed at the lowest possible rates.

May 1824.

J. W. DURYEE, DRUGGIST,

No. 206 Pearl-street, next door to the corner of Fly Market-slip,

NEW-YORK,

Has for sale a general assortment of Drugs, Medicines of all kinds, Perfumery, Dyers' and Fullers' articles, Patent Medicines, &c. of the best qualities and low prices.

MEDICINE CHESTS put up and repaired with care and despatch, by a professional character, and all orders left at 206 Pearl-street, will be promptly attended to.

May 1824.

E. RILEY,

Musical Instrument Maker,

MUSIC ENGRAVER, PRINTER, AND PUBLISHER.

No. 29

CHATHAM-STREET, NEW-YORK.

Violins—Tenors	Bass Drums
Violincellos	Tenor Drums
English and Spanish Guitars	Treble or Side Drums
German Flutes, with 1, 4, 5, 6 and 8 keys	Tambourines
Single and double Flageolets	Children's Drums
Clarionets, B's, C's F's and E's	Bugles, with and without keys
Bassoons	Trumpets and French Horns
Violin Strings	Drum Sticks and Belts
Violincello Strings	Drums repaired
Guitar Strings	Violin Bows, &c. &c.
Bassoon, Hautboy and Clarionet Reeds	Bridges, Pegs, Mutes, Tuning Forks, and
Fifes, B's, C's and D's	Piano Hammers.

Music Paper and Books—Music Bound.

☞ Musical Instruments of all kinds TUNED and REPAIRED.

The Piano Forte, English and Spanish Guitar, Violin, Violoncello, Clarionet, single and double Flageolet, and German Flute, taught by proper masters. May 1824.

WM. A. COLMAN,

Bookseller, Commission Merchant & General Agent,

86 Broadway, Corner of Wall-street,

NEW-YORK,

Has for sale, London Books, at American prices. Also, a valuable collection of American standard works, and new publications, at low prices.

Libraries furnished at a short notice. Many rare and curious works may be had here, and all sold for cash.

Agent for the National Intelligencer, De Grand's Report, Nile's Weekly Register, American Farmer, &c. &c. May 1824.

PAPER WAREHOUSE,

No. 49 JOHN-STREET, NEW-YORK.

J. SEYMOUR respectfully informs Booksellers and Stationers, that he has constantly on hand a supply of the best qualities of Medium and Demy Writing Paper; hot-pressed and plain Folio and Quarto Post and Cap; with various kinds of Royal and Medium Printing; for sale on *COMMISSION*, at the lowest prices.——Orders from the Southward will meet with prompt attention.

☞ *PRINTING* executed on liberal terms. May 1824.

UMBRELLA AND PARASOL MANUFACTORY,

209 Pearl-street, four doors above Maiden-Lane, NEW-YORK,

Merchants, shippers, agents, and others interested in the southern trade, are respectfully informed, that the subscriber (who is a regular manufacturer) has on hand a complete assortment of Umbrellas and Parasols, embracing a fanciful and elegant variety of seasonable articles, suited not only to the above, but also to the Spanish market. From the long experience in business, and the general satisfaction that he has given to those who have honoured him with their commands, he indulges a belief that those who deal in the above goods will find his assortment at all times equal, if not superior, to any offered for sale in this country; all which he will dispose of Wholesale or Retail, at a small advance for cash or approved paper.

May 1824. *SAMUEL REDMOND.*

Fashionable and Cheap, Wholesale and Retail,

HAT STORE.

R. BAIRD,

100 *Catherine-street, near the Market,*

Has constantly on hand, a handsome assortment of HATS of the latest fashion, which for a beautiful jet gloss, elasticity, durability, and lightness, are not surpassed by any; which he is enabled to sell as low, or lower, than any sold in this city, and has on hand,

Oval Water-proof Beaver Hats, from		$7	to	9
Do.	do. Castors,	4	to	6
Do.	do. Rorams,	2 50	to	3 50
Bell shape, glue stiffened, do.		2	to	2 50

Youths' and Children's Hats equally low.

*** Country merchants and others would do well to call and judge for themselves.

New-York, May 1824.

HOOKER'S POCKET

PLAN OF THE CITY OF NEW-YORK,

COMPILED AND SURVEYED BY WM. HOOKER,

Hydrographer and Engraver, New-York.

Sold by W. Hooker, Instrument and Chart Seller, No. 202 Water-street: Where all the Standard Nautical Works are published, under the inspection of EDM. M. BLUNT, and by E. & G. W. Blunt, 147 Fly Market-slip, New-York.

May 1824.

FIRTH & HALL,

Musical Instrument Makers and Music Sellers,

No. 358 Pearl-street, near Franklin Square,

NEW-YORK,

Have always on hand, a choice collection of *Fashionable Music and Musical Instruments*, of the most celebrated makers, and of their own manufacture: together with every other article of musical merchandise, wholesale and retail, on the most liberal terms.

BANDS supplied with instruments, &c. Musical instruments of all kinds tuned and repaired in the neatest manner.

*** All orders, from any part of the United States and West Indies, thankfully received and attended to with care and despatch. May 1824.

HENRY A. CHARLOCK,

Copper Smith,

No. 205 WATER-STREET,

NEW-YORK,

Makes all kinds of Copper and Sheet Iron Work, on the most reasonable terms. May 1824.

NAVIGATION,

The Lunar Observations, and every other branch of Nautical Science,

Carefully and accurately taught by E. C. WARD,

Professor of Nautical Astronomy, &c. &c. and Teacher of the Mathematics in the United States Navy,

No. 71 Catherine-street.

For particulars, inquire at Mr. Hooker's Nautical Store, 202 Water-street; E. & G. W. Blunt, Nautical Book and Chart Store, 147 Fly Market-slip, New-York.

May 1824.

H. GORTON,
STATIONER AND BOOKSELLER,
No. 151 Water, near Fly Market-street,
NEW-YORK.
BOOKBINDING AND PRINTING NEATLY EXECUTED.
N.B. Mercantile and Commercial BLANKS always on hand.

H. G. having a Ruling Machine and Bindery, is enabled to manufacture account books to any pattern, at the shortest notice and on the most reasonable terms. May 1824.

Upholstery Warehouse, &c.

J. & W. F. PHYFE, UPHOLSTERERS, &c. No. 34 MAIDEN-LANE, *New-York*, respectfully inform their friends and the public, that they have commenced business at the above place, and keep constantly on hand, first quality of *Feather Beds* and *Bedding*, pure Curled Hair *Mattresses*; also, Moss, Flock, Cotton, and Wool Mattresses, Cotts, &c.

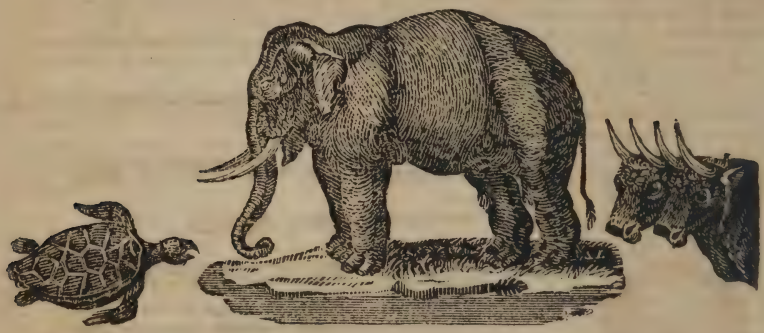
PAPER HANGINGS, wholesale and retail.

CURTAINS made and put up in the most fashionable style.

☞ Shipping supplied on the most reasonable terms. May, 1824.

DRUGS, MEDICINES, AND DYE-STUFFS,
Wholesale and Retail, by
SHOTWELL & HAYDOCK,
No. 405 PEARL-STREET,
NEW-YORK,

Who have constantly on hand a general assortment of genuine DRUGS. MEDICINES, &c. Country orders for any article in their line executed immediately. Ships and private families supplied with Medicine Chests at the shortest notice. May 1824.



COMB FACTORY.

AT THE OLD STAND,
No. 409 PEARL-STREET,
NEW-YORK,
Where a general assortment of SHELL, IVORY, MOCK-TORTOISE AND HORN
COMBS
May be had, WHOLESALE and RETAIL, by
ROBERT GEDNEY.

*** Shell and Horn purchased in large or small quantities. May 1824.

COURT OF FANCY.

No. SMITH PRENTISS'

REPOSITORY OF UTILITY AND ELEGANCE,

(SIGN OF THE GOLDEN ROSE,)

149 *Broadway, corner of Liberty-street,*

NEW-YORK.

This well known establishment continues to preserve its character for furnishing the public with the *choice and rare* of every article in its extensive line of business. Gentlemen may rest assured, that such articles as they may have occasion for, where luxury could be combined with utility, will here be found with those joint properties. Every article for the Ladies' toilet, in the choicest variety; fancy ornaments of every description; articles of use, with every addition that elegance or convenience can desire; articles of fancy, with every embellishment that taste and genius can invent, are here in the most extensive assortment.

PERFUMERY and COSMETICS of unrivalled excellence, either of foreign or domestic manufacture. Every article that has yet been found instrumental in the creation, and preservation of beauty, can be furnished of superior quality, at the Repository, on demand. Among them may be enumerated the celebrated

Milk of Roses, a cosmetic of the most useful and efficacious nature.
Almond Paste, a conservative preparation for softening and cleansing the skin.
Cold Cream, a refreshing emollient for allaying cuticular irritation.
Maldivian Oil, for strengthening the hair and preventing its turning gray.
Cosmetic Wash Balls, possessing every balsamic property.
Otto of Rose Wash Balls, combining the perfume of the rose with the mollifying properties of the cosmetic.
Honey Water, for giving a beautifying gloss to the hair.
Maldivian Extract and Pomatum, for strengthening and promoting the growth of the hair.
Carbonic Dentrifice, for cleansing the teeth, preserving the gums, and giving a sweetness to the breath.
Restorative Lotion for the Gums, a valuable toilet appendage for the teeth.
Pearl Powder, an inimitable preparation for softening the skin.
Vegetable Rouge, an innocent preparation for reviving the colour of the cheeks, and giving animation to the countenance.
Extract of Roses, a fragrant and delectable perfume.
Lip Salve, for enhancing the natural ruby of the lip and preventing them from being chapped or cracked.
Shaving Cakes, of several qualities.
Extract of Lavender, imparting a delightful odour, and possessing great medicinal properties.
Esprit de Rose, a delicate and fragrant article.
Tonquin Extract, a valuable perfume.
Extract of Musk, a powerful perfume in general use.

To which may be added every article indispensibly necessary for the toilet, such as persons of taste and fashion are always furnished with, and of the most rare and valuable qualities; calculated to give softness, smoothness and fairness to the skin—sweetness, strength and whiteness to the teeth and gums—a glossy luxuriance to the hair—a pouting redness to the lips—animation and colour to the cheeks—and an agreeable *tout ensemble* to the person.

N. SMITH PRENTISS respectfully invites the Ladies and Gentlemen of the city, and strangers, to honour his Repository of Fashion with a call; where their orders will be gratefully received and satisfactorily executed. Among the great variety of *FANCY ARTICLES*, he begs leave to enumerate the following:—

Rodgers' Penknives: great attention is directed to the importation of this important article of cutlery; the best patterns are selected and sold at the lowest prices.

Warranted Razors, which are made by a particular cutler expressly for N. S. Prentiss, as appears by his name on the blade.

Mauguin's Damascus Razors—Razor Strops of different descriptions—Composition for Razor Strops—German and Sheffield Razor Hones—Gentlemen's Dressing Cases, Shaving Cases, and Travelling Pouches—Cut Glass, Metal, and Wood Shaving Boxes, and superior Shaving Brushes—Naples Shaving Soap, in pots—Suspenders—Gentlemen's Gloves—Hair, Clothes, Teeth, Fine Comb, Nail, and Hat Brushes,—Havana Segars of the best quality—Segar Boxes—Waterloo Cravats—Cravat Stiffners—Watch Ribbons of superior quality—Fine Steel Waist Buckles—Reticules, an elegant assortment—Cut Glass Miniature Bottles, Vinegarets, Volatile Salts Bottles, and Toilet Bottles—Gold and Silver Pencil Cases and Tooth Picks—Silver and Tortoise Shell Tongue Scrapers—Ladies' Japan-

ned Dressing Cases—Thread Cases, Needle Books, Needles, and Bodkins—Black Dressing Pins and Hair Pins—Curls, Curling and Pinching Irons—Ivory Teething Rings—Nail Nippers—Elastic Garters—Nut Pickers—Visiting Cards and Card Cases—Fine and Common Scissors—Ivory superfine Combs—Dressing Combs—Tortoise Shell and Morocco Spectacle Cases—Pocket Books, a very complete assortment, and at the lowest prices—Fancy Purses, of beads, velvet, morocco, silk, &c. May 1824.

Mathematical, Naval, and Commercial School,
BY M. NASH,
No. 34 Nassau, corner of John-street.

M. NASH continues to instruct young men, intended for the sea, in the theory and practice of Navigation, including the use of instruments, also, the method of finding the Longitude by Lunar distances, enabling them to keep the journal of a ship at sea in a correct manner, immediately after leaving the school.

He also offers his services, to sea-faring gentlemen of experience, for private instruction in a great variety of astronomical problems, useful at sea, especially those explained and solved in Stansbury's Tables, whereby the problems of finding the latitude by single or double altitudes of the sun, or by the meridian altitudes of the moon, planets, or fixed stars; also of computing the longitude from lunar observations, finding the true time at sea, &c. are solved in a most easy, accurate and expeditious manner.

Those who purchase Mr. Stansbury's Tables at the school, shall be instructed in the use of them on liberal terms. May 1824.

FANCY CHAIR STORE.
THOMAS BROWN, Fancy and Windsor Chair-Maker,
No. 63 John-street,
NEW-YORK,
(*The store formerly occupied by Joseph Riley,*)

Has constantly for sale, a very general assortment of Fancy and Windsor CHAIRS, of the newest fashion, and on the most reasonable terms.

☞ All orders punctually attended to, and reasonable allowance made to shippers. Old Chairs repaired, painted, and regilt. May 1824.

CHARTS, NAUTICAL BOOKS, &c.

EDMUND & GEORGE W. BLUNT,
No. 147 Fly Market-street,
NEW-YORK,

In addition to a very extensive assortment of CHARTS, NAUTICAL BOOKS and INSTRUMENTS, have just published,

NEW LUNAR TABLES for correcting the Apparent Distance of the Moon from the Sun, Fixed Star, or Planet, for the effects of Refraction and Parallax: Illustrated by appropriate Rules and Examples. To which are added, plain and easy Directions for taking a Lunar Observation, and some useful remarks on the Sextant. By E. C. WARD, Teacher of Navigation, Nautical Astronomy, &c. United States Navy.

A CHART OF THE HARBOUR OF NEW-YORK, dedicated to the New-York Chamber of Commerce, by EDMUND BLUNT, Hydrographer.

"New-York Chamber of Commerce, Dec. 24, 1823.

"The President having informed the Chamber that Mr. Edmund Blunt had presented a Chart of the Harbour of New-York, and requested permission to dedicate it to the New-York Chamber of Commerce —Resolved, That the President be requested to express the thanks of this Chamber to Mr. Blunt, and the acceptance of his Chart of the Harbour, and that they will with pleasure accord with his request to dedicate the same to the Chamber. Extract from the minutes,

(Signed) "JOHN PINTARD,
"Sec'ry N. Y. Chamber of Commerce."

The title of this very valuable Map is—"The Harbour of New-York, with the Coasts of Long Island and New-Jersey adjacent, from Fire Islands to Barnegat Inlet, compiled and surveyed by EDMUND BLUNT." We should think, that every merchant, as well as every shipmaster, would procure a copy of this Chart. To the former it would be very convenient—to the latter, it is indispensable. It is made from actual surveys, and must have cost the publishers much labour and expense. Such industry, in so good a cause, deserves liberal remuneration, and we trust will receive it.

*** Nautical Instruments correctly repaired by E. & G. W. Blunt. May 1824.

WASHINGTON HAT STORE,

No. 106 *Chatham*,

Corner of Pearl-street, New-York.

HATS,

Of every description, made and sold at the most reduced prices, and for fashion, beauty, lightness, and durability, are not surpassed by any in the United States.

Wholesale and Retail, by

SAMUEL W. SEELY.

July, 1824.

JOHN HOOPER & RUFUS KEELER,

HATTERS,

Having entered into copartnership, under the firm of HOOPER & KEELER, will carry on the Hatting business at the store formerly occupied by the late *David Munson*, esq. situated at the JUNCTION of

Chatham-square, Catherine-st. and the Bowery;

Also at their manufactory at SAWPIT. At which places they now offer for sale a general assortment of

HATS,

Suited to the various wants of the community. Without attempting a precise description of the kind and quality of their Hats, they intend to maintain a regular and constant supply of such as shall accord with the most prevailing fashions; and in pursuing that course, they feel confident of affording satisfaction—not only to the customers of their late worthy and lamented predecessor, but to the public at large.

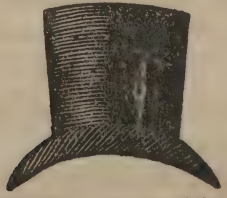
As one of the partners will be personally and constantly engaged in the manufacture of their hats, it is fairly presumed that in all respects they will answer the expectation of their friends.

They are now manufacturing gentlemen's Drab Hats, adapted to the present warm season, which for lightness and durability they think cannot be excelled.

A constant supply of Youths, Boys, and Children's fancy Hats, together with Gentlemen's Hats of all descriptions, will be maintained, and sales made at wholesale and retail, on the most favourable terms for prompt pay.

New-York, July, 1824.

HAT STORE.



JOHN L. SMITH,

Respectfully informs his friends and the public generally, that he has taken the old established hat store,

No. 1 *BOWERY, Corner of Division-street*,

NEW-YORK,

Where he intends keeping a general assortment of *HATS*, of the most fashionable patterns, at the lowest prices.

☞ Persons wishing to supply themselves, either wholesale or retail, with Hats, may rest assured that they may be furnished at the above store with those manufactured of the best materials by first rate workmen.

Gentlemen's Beaver, Water-proof, Castor, and Roram Hats, always on hand.

New-York, July, 1824.

C

REPEATING GUNS.

Among the various inventions of the present age, the Repeating Guns, which have been invented by an ingenious mechanic of the city of New-York, certainly are not the least important, either for public or private use—it having now arrived at that degree of perfection that no doubts remain of its usefulness. Its feasibility has been fully tested, by continued experiments, for three years, the result of which has clearly demonstrated, not only the efficiency of the arms, but the perfect safety, simplicity, and convenience, of using them.

This improvement applies to every species of fire arms, without changing their form or pattern. The charges may be extended to any number, from three to twelve, twenty, or even thirty, without adding materially to the weight or incumbrance of the arms ; which charges being each under the distinct and separate control of the gunner, can be fired in less than two seconds to a charge, or of any longer periods, at the pleasure of the gunner, with the same effect as the ordinary fire arms. The guns can be used to load and fire any number of single charges keeping in reserve whatever charges the pieces may contain, without affecting them in the least; or, after having disposed of all the reserved charges, it can then be used as a single charge gun, with the advantage over the ordinary guns of at least one third, in consequence of their priming themselves.

These Guns and Pistols must be found of very great importance, not only for naval and military purposes, but for all the ordinary uses of hunting and sporting ; and, in fact, in all cases of emergency, where it is important to increase the efficiency of fire arms tenfold, that object can be effected by means of these arms.

REMARK.

Public good, and a desire to serve the ingenuity and perseverance of the individual to whom we are indebted, induces the author of this work to insert the above, having satisfactorily witnessed the utility of his Guns over all others ever invented, and he hesitates not a moment in saying, they are worthy the attention of every nation, particularly those who are compelled to resort to arms. July, 1824.

DANIEL COLEY,

At his CLOTHING STORE, No. 120 Cherry-street, New-York, keeps constantly on hand a general assortment of

READY MADE CLOTHING,

Where Citizens, Officers, and Seamen, may supply themselves on the most satisfactory terms.

Measures taken and executed with neatness and despatch. July, 1824.

THOMAS J. HARRIS,
HAT MANUFACFURER,

No. 52 Chatham-street,

NEW-YORK,

Where he intends keeping a general assortment of HATS, of the most fashionable patterns, at the lowest prices.

☞ Persons wishing to supply themselves, either wholesale or retail, with Hats, may rest assured that they may be furnished at the above store with those manufactured of the best materials by the first rate workmen.

Gentlemen's Beaver, Water-proof, Castor, and Roram Hats, always on hand.

New-York, July, 1824.

T. BUSSING,

Pocket Book and Ladies' Reticule Manufactory,

No. 76 William-street, near Maiden-Lane,

NEW-YORK,

Has constantly for sale, Sufflets, patent locks—roll-up Pouches—Reticules—Ladies' Thread Cases—Note Books—Wallets of every description—Tablets—Backgammon Boxes, Razors, &c. &c.

☞ Country and Southern Merchants are particularly invited to apply.

July, 1824.

J. FERRIS'
Blind Manufactory,
No. 550
Pearl-street, near Broadway,
NEW-YORK.
Wholesale and Retail.

July, 1824.

FORTUNE'S HOME FOR EVER!!!

P. CANFIELD'S
New-York State Lottery Office, 139 *Broadway*,
New-York.

P. CANFIELD'S
Pennsylvania State Lottery Office, 129 *Chestnut-st.*
Philadelphia.

P. CANFIELD'S
Maryland State Lottery Office, 180 *Market, near Charles-street*
Baltimore.

Where have recently been sold and paid prizes of

$25,000,—$20,000—$15,000—$10,000—$7,500—$5,000
$4,000—$2,000—$1,500—$1,000, &c.

and many other valuable prizes, together amounting to more than

$300,000.

And where may be had more *Capital Prizes*, for which the cash, as usual, will be advanced as soon as drawn.

Orders, post paid, for Tickets or Shares, or for Certificates, will be promptly attended to. *FOREIGN BANK NOTES* exchanged as above at the lowest rates of discount, and the highest premium given for Gold and Spanish Dollars. July, 1824.

Messrs. GILL & Co.
No. 41 Chatham-street, New-York,

Embrace the earliest opportunity of informing their friends and the public generally that they have commenced manufacturing gentlemen's BOOTS and SHOES in all their varieties, upon the most fashionable and fitting principles, such as will afford at once *ease* and *comfort*, combined with *elegance* and *durability*.

Messrs. G. & Co. beg leave to assure those who may honour them with their patronage, that it will be their constant study to select the very best materials and workmanship.

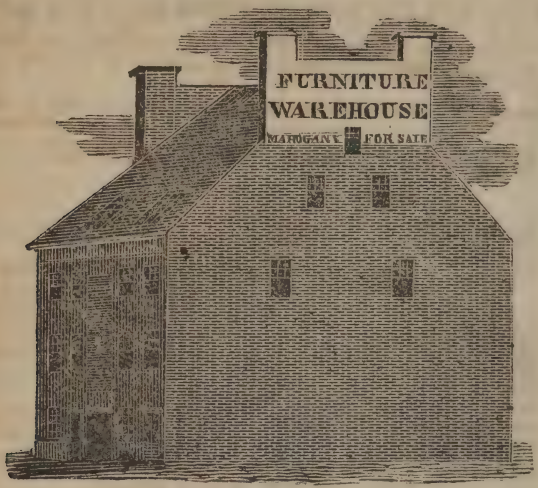
G. & Co. earnestly solicit an inspection, conscious that a discerning public will at once, not only favour them with their custom, but with their warmest recommendation.

Wellington Boots, made to measure, of the first quality in every respect,							$5 00
Do.	do.	ready made, very prime,					4 00
Do.	do.	do.	do.				3 50
Do.	do.	do.	do.				3 50
Do.	do.	do.	do.				3 00
Boy's Boots,				from	2 50	to	3 00
Washington Boots,					1 75	to	2 75
Gentlemen's walking and dress Shoes and Pumps.					1 50	to	2 25

July. 1824.

Important Notice to Navigators, &c.

Captains of vessels and others, wishing to have their CHRONOMETERS repaired and correctly rated, are recommended to Mr. JAMES LADD, No. 30 Wall, near William-street, New-York, who is enabled, by means of actual observations, and a TRANSIT INSTRUMENT, which he has lately imported, to rate them in a correct manner. By attending to this, they will save much trouble and detention, as they will not be obliged to wait until their instruments have been *sent to London for repair*, and returned to this city.—☞ See his advertisement in this work. July, 1824.



ISAAC CROSS'S

WARE HOUSE OF CABINET FURNITURE,

No. 472 PEARL-STREET,

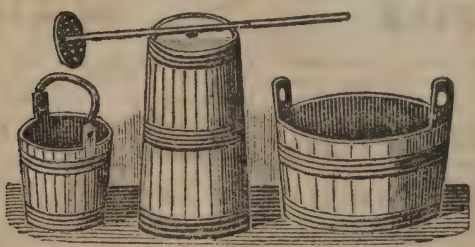
(Near Chatham-street,)

July, 1824. NEW-York.

CEDAR WARE FACTORY,

No. 185 *Hester-street,*

NEW-YORK.



CHARLES H. REDMAN,

Continues to manufacture all kinds of Cedar Ware, such as brass, iron, and wood-bound

Churns, Coolers, Pails, Tubs, Bathing Tubs, &c.

N.B. All orders punctually attended to. July, 1824.

WHOLESALE AND RETAIL

HAT MANUFACTORY.

LEONARD BOND,

Has constantly on hand, at his Store 208 CHATHAM-STREET, two doors from the Bowery, a very large and beautiful assortment of Hats, which he is selling at the lowest market prices.

All orders thankfully received and strictly attended to. July, 1824.

FASHIONABLE HAT STORE,

No. 108 *Cherry-street,*
NEWYORK.

H. W. TAYLOR, (late of the firm of G. White & Co. of Broadway,) has opened the above store on his own account; where he would be glad to wait on any of his old customers and the public generally. He has commenced with a fresh stock of the most fashionable shaped hats; likewise, a large assortment of men's low priced hats—boys' do.—children's fancy do.—men's and boys's wool and straw hats; all of which he will sell at wholesale or retail, as low as can be purchased elsewhere.

Hats of any shape or quality made to order. Wholesale orders supplied promptly and on the most reasonable terms. New-York, July, 1824.

THOMAS YATES,

HAT MANUFACTURER,

No. 53 Chatham, nearly opposite Chamber-street,
NEW-YORK,

Having laid in a general assortment of Drab and Black WATER PROOF HATS, which, for cheapness, lightness, and durability, are not surpassed by any made in the Union, trusts by assiduity and attention to merit the patronage of his friends and the public.

Hats of any shape or quality made to order.

☞ Country orders executed with despatch, and on reasonable terms. July, 1824.

Patent Bakery,

No. 98

PINE-STREET, NEW-YORK.

WILLIAM T. HUNTER,

PATENTEE,

Respectfully informs his friends and the public, that his Bake-house is painted *yellow*. He is prepared to furnish, in any quantity, Pilot and Navy Bread, Butter and Water Crackers, Wine Biscuit, and Flour for the use of families.

N. B. The experience of 18 years, has proved that Bread manufactured on his plan is not liable to become mouldy, and never creates worms as that made in the usual way. The U. S. Navy on this station, receive their supplies from his establishment.

July, 1824.

WILDER & CAMPBELL,
BOOKSELLERS,
No. 142 Broadway, NEW-YORK,

Have made arrangements, by the residence of their Mr. Campbell, for receiving *early supplies* of the new foreign publications, and will thankfully receive orders for the importation of Books, *old* or *new*, which will be executed with promptness and on reasonable terms.

Foreign Catalogues may be consulted at their store, having the prices of both the new and scarce works. Catalogues will be furnished to order.

They offer for sale, an extensive variety of Books, *American* and *English*, and are constantly adding to their stock, in every branch of literature and the arts.

Subscriptions received for any of the periodical works of Europe or the United States, and sent to any part of the country as directed.

Mr. Campbell being in London, will pay particular attention to orders for old and rare works. A constant supply of the best made LONDON GLOBES. July, 1824.

Black Lead Pencils and Crayons.

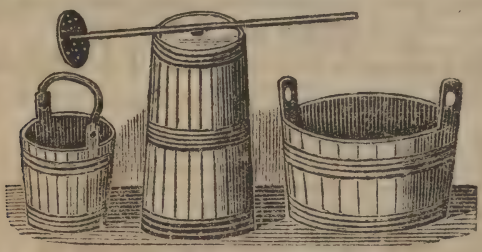
CUNNINGHAM'S American manufactured Pencils and Crayons, which have been pronounced, by good judges, to be equal, and in many instances superior, to the best English.

Fifteen hundred gross have been disposed of within the last two years, and always on the express condition, that if any of an inferior quality should be detected, they would be taken back, and the money refunded even to half a pencil; and not a single complaint has been made. The manufacturers have spared no pains nor expense to bring them to the utmost perfection; and if any gentlemen will point out any defect, it will be thankfully received.

Also, a constant supply of all kinds of PAPER, viz. Letter, Foolscap, Folio Post, Medium, Royal, and Demy, received and sold on commission, with a general assortment of *BOOKS and STATIONERY*, by

ROBERT M'DERMUT,

July, 1824, No. 222 Pearl-street, New-York.



J. KNOWLTON,
Willow Basket and Wooden-ware Store,
No. 312 Broadway, opposite the Hospital,
NEW-YORK,

Has constantly for sale, on reasonable terms, a large assortment of the following articles: Willow cradles and waggons, ladies' fancy willow baskets, willow market baskets with and without covers, bottle baskets, clothes and travelling baskets, wooden bowls, bread trays, tubs, pails, coolers, churns, brooms and brushes of all kinds, door mats, table mats, bellows, coal-sifters, riddles, brass, iron and hair sieves, spinning wheels, butter ladles and prints, twine, milk and butter pails, keelers, wash tubs, shaker corn brooms, hair and hemp clothes lines, clothes horses, mortars, fawcets for distillers and grocers, shovels, safes, reels, &c. &c. July, 1824.

MONEY TO LEND

ABRAHAM MITCHELL, Licensed Pawn-Broker, Hudson, one door from Chamber-st. continues to make liberal advances on Gold and Silver Watches, Diamonds, Jewelry, Silver Plate, Dry Goods, Clothing, Household Furniture, &c.

☞ Fair advances made on merchandise. July, 1824.

STOUT'S
ENGRAVING AND PRINTING ROOM,
No. 172 Broadway, corner of Maiden-lane, and No. 8 Wall-street, opposite the Custom-House,
NEW-YORK.

Visiting Cards, Merchants' and Mechanics' Cards of Address and Invitation Cards, elegantly engraved, embossed, and printed.

Masonic Medals and Jewells made to any pattern.

Seals—Notarial, Consular, Desk, and Society Seals, &c.

Engravers' Copper, a constant supply from Harris' manufactory, London, cut to any size to suit engravers and artists.

Engravers' Instruments, from Fenn's and Hoole's, London.

J. D. STOUT, Engraver in General.

N.B. Foreign orders for Engraving, Printing, and Seal Cutting, strictly attended to as usual. Also, Door Plates, Knockers, and Number Plates, made to order, either of Brass or Silver, of which he has many specimens on hand. July, 1824.

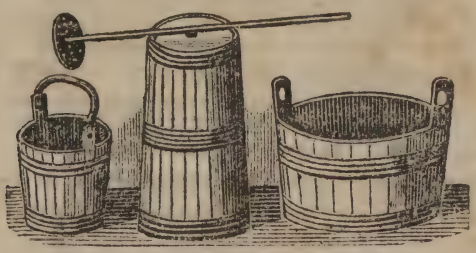
WOOD WARE AND BASKET STORE.

W. B. WINDLE,
No. 115 Chatham-street, and No. 56 Maiden-lane,
NEW-YORK,

Has constantly on hand a great variety of articles, which he will sell on reasonable terms; such as—Square and oval Market Baskets, with and without covers; Clothes Baskets with covers, for cast-off linen; Bottle Baskets, to hold from half to twelve dozen; Ladies Reticules; Travellers' and Work Baskets; Children's Chairs, and Carriages, and Cradles, which are very healthy and cool in the summer season.

Wood Ware of all kinds, such as—Milk and Butter Pails, Churns, Keelers, Wash Tubs, Butter Ladles and Prints; Iron, Brass, and Hair Sifters; Brooms and Brushes of every description; Shaker Corn Brooms; Hall, Entry, and Table Mats; Fancy and common Bellows; Hair and Hemp Clothes Lines; Clothes Horses; Mortars for Apothecaries and private families; Fawcets for distillers and grocers, Knot Bowls; Dry measures; sugar and flour Boxes; Bake Trays, with and without covers; malt Shovels; Wire Cloth for Fanning mills, sales, millers, paper-makers, and others; Flax, Wool, and Quill Wheels; Reels; Swift and Patent Heads for Wool Wheels.

N. B. Just received, a number of Patent Churns, on a very improved plan, with a great many other articles, too numerous to mention. July, 1824.



JOHN SHOTWELL'S
CEDAR WARE FACTORY,
No. 223 Washington-street,
NEW-YORK,

Where he has constantly on hand, an extensive assortment, which he offers for sale on moderate terms.

N.B. All orders thankfully received and punctually attended to from any part of the continent. July, 1824.

STANDARD WORKS,

PUBLISHED BY EDMUND M. BLUNT, FOR THE NAUTICAL STORE,

202 Water, corner of Fulton-street, New-York,

WILLIAM HOOKER, AGENT,

BOOKS:

BOWDITCH'S PRACTICAL NAVIGATOR, 5th edition, stereotyped. [*This work has been re-published in London, and has a decided preference to any extant.*]

BLUNT'S AMERICAN COAST PILOT, 10th edition, greatly improved.

THE MERCHANT'S AND SHIP MASTER'S ASSISTANT, comprehending all the necessary mercantile information for Merchants and Shipmasters. [*In this work all recent commercial regulations are introduced, and the most experienced will find something new.*]

NAUTICAL ALMANACS, from the year 1811 to 1826, both inclusive—to be continued annually. Explanation stereotyped, and English copy corrected.

Errors in the English copy of the Nautical Almanac.

In { 1824, Sixty errors / 1825, One Hundred and Twenty errors / 1826, Over Fifty errors } Corrected in BLUNT'S EDITIONS ONLY.

And he also refers the reader to remarks at the close of this advertisement relative to the Nautical Almanac from the year 1822 to 1825, both inclusive.

[*These corrections have been attended with great expense and trouble. An error in a Nautical Almanac may be followed with serious consequences.*]

SEAMANSHIP and NAVAL TACTICS, Second Edition, with Plates.

CHARTS:

A NEW CHART, extending from New York to Havana, including Bahama Banks and Channels, improved by actual Surveys and Plans of Harbours, surveyed by order of the United States Navy Department, 1820, and further improved by a survey from Sandy Hook to Cape May, in 1822, *under the direction of Captain Colesworthy and Edmund Blunt, Hydrographer, in sloop New Packet.*

———————, of the Mississippi River, extending to New-Orleans, including Mobile, &c. with Sailing Directions, and Plan of Mobile, on a large scale from actual Survey.

———————, of Bahama Bank, from actual Survey, made in Sloop Orbit, in 1820, with Sailing Directions, by the direction and at the expense of the proprietor, by E. C. WARD, U. S. Navy, and EDMUND BLUNT, Hydrographer. [It is worthy of remark, that nineteen vessels were lost on the Bahama Bank the year previous to this survey, since which accidents have rarely occurred, and the correctness of the Chart admits not a question, but has received the approbation of thousands as being the most correct Chart of Bahama Bank extant.]

———————, from New-York to Nova Scotia, extending from latitude 38° N. to latitude 47° N. longitude 68° W. to longitude 74° W. including the whole of St. George's Bank, improved to August, 1821, by government and other surveys, by which the latitude of the South Shoal of Nantucket, was found 22′ wrong, and is here, for the first time, published correct. [*This survey has since been confirmed by three expeditions fitted at Nantucket,*] and has received the following

REPORT

Of the Committee appointed to examine Blunt's Chart of the North-East Coast of North America, relative to the South Shoal of Nantucket.

The Committee appointed to examine the evidence relative to the position of Nantucket South Shoal, RESPECTFULLY REPORT,

That the South Shoal of Nantucket, which has been heretofore placed in lat. 40° 42′, or thereabouts, on the Charts of the Coast of North America, has been placed in lat 41° 4′ on a Chart of part of the Coast of North America recently published by E. M Blunt, on the following evidence of its positions :—

1st A survey by Capt. J. Colesworthy, made in June and July, 1821, for account of, and at the expense of Mr. E. M. Blunt.

3d. Obseavations of Capt. Colesworthy on the 11th of September following, assisted by Mr. Walter Folger, junr. of Nantucket, who accompanied him at the instance of several of the inhabitants of that Island, to determine whether a mistake had or had not been made by Capt. Colesworthy in his previous surveys.

At this time (11th Sept.) a good observation was had at noon half a mile south of the Shoal according to the account given by Mr. Folger.

3d. A survey made by William Coffin, P F. Coffin, Jona. C. Briggs, and several other experienced navigators of Nantucket, who were provided with a sloop equipped at the expense of the inhabitants of that Island, by subscription, for the express purpose of surveying the South Shoal, to ascertain whether the Shoal surveyed by Capt Colesworthy was the "*Old South Shoal,*" or not

This party left Nantucket on 20th of October last, in the morning, and "*at noon of the same day observed in latitude 41° 4″, by four good instruments, the Shoal east two miles distant.*

After this they traversed to the S.S.W.—South, East, N. and E. and N. and W. between the parallels of 40° 40′ and 41° 4′. They "had 30 fathoms in 40° 40′, and on running one hour to the south had 35 fathoms"

In traversing over the position assigned to the Shoal on the old Charts, they found 30 fathoms, and not less, at any time, to the south of 40° 40′; from that depth the soundings were found regular to 15 fathoms near the Shoal in 41° 4′.

Mr Walter Folger, junr. says in a letter, dated October 21st, "this evening the vessel arrived here that was sent out to find the South Shoal in 40° 42′, on board of which were some of those who were most positive that it lay in that latitude. They inform me, that they could not find less than 30 fathoms water on that parallel. They observed yesterday, west from the Shoal that Capt. Colesworthy surveyed 21st June and 9th July, and that we observed at the south of half a mile distant on the 11th September. *I could then see the vessel from my house.*"

This statement is supported by the letters of William Coffin, P. F. Coffin, Jona. C. Briggs, and several others, which give particular accounts of the survey, and which accompany this Report.

Your Committee are, therefore, of opinion, that the position assigned to Nantucket South Shoal by Mr. E. M. Blunt, on the Chart recently published by him (in lat 41° 4′ N.) is the true place of the Shoal.

Your Committee recommend the following resolutions for adoption :—

Resolved, That this Society is satisfied that the position assigned to Nantucket South Shoal (lat. 41° 4 N.) by Mr. E. M. Blunt, on a Chart of part of the Coast of North America recently published by him, is the true place of the Shoal, and that the position of that Shoal is established by more sufficient testimony than that of any other Shoal on the Coast of North America.

Resolved, That in detecting an error of 22 miles in the position assigned to the dangerous South Shoal of Nantucket on the Charts heretofore published, Mr. E. M. Blunt has rendered an important service to the shipping interest, and to mariners of the United States.

Resolved, That the Secretary be directed to transmit to Mr. E. M Blunt a copy of the foregoing Report and Resolutions.

H. AUSTIN,
ISAAC WAITE,
E. FISHER. } Committee.

A NEW CHART, of the Atlantic or Western Ocean, improved to 1821, with an Analysis of the authorities upon which the dangers have been inserted on the Chart. The Tracks extend to the Equator, and are continued on the Chart of the South Atlantic Ocean. [*This is the only general Chart extant which has the latitude of the South Shoal of Nantucket, within 22 miles correct*, and which cannot be copied on any Chart sold in this country.]

———, of the South Atlantic Ocean, containing more authentic information than any extant, part of which describes dangers lately discovered, with original Plans of Harbours and Views. [*This Chart, with that of the Western Ocean, are not only done up in suitable forms for Ship-Masters, but are elegantly mounted on rollers, and expressly adapted to Offices, as works of reference in Commercial transactions.*]

———, of the North Coast of Brazil, showing the entrances and courses of the rivers Para and Amazon.

———, of the West-Indies, on six sheets, which may be had separate: all which include the Gulf of Mexico.

———, of the River La Plate, according to the late surveys.

———, of the Coast of Guayana.

———, of the Coast of Brazil.

———, of the Island of Bermudas, with Sailing Directions on the Chart.

———, of Long-Island Sound, improved to 1823.

———, of the Cape de Verd Islands, on a very large scale.

———, of the Coast of Labrador.

———, of Newfoundland.

———, of the Coast of Brazil, from Maranham to the entrance of the River Plate, including the Harbours of Rio Janeiro, Bay of Saints, St. Salvador, Pernambuco, Rio Grande, and the Island of Fernand de Noronha; on an enlarged scale, compiled and drawn from actual surveys made by order of the government of Portugal, &c. the Sailing Directions for which are accurately described in Blunt's Am. Coast Pilot.

PLAN of New-London Harbour, surveyed by Charles Morris, Esq. of the United States Navy, by order of Commodore Rodgers, and to him respectfully dedicated.

ALSO FOR SALE, BY W. HOOKER 202 Water-st., and E. & G. W. BLUNT,

Repeating Circles—Brass Sextants, with Teleshopes complete, in mahogany cases—Brass Sextants for the pocket—Ebony Sextants—Quadrants of superior make, with Telescopes—ditto without—Artificial Horizons—Steering, Storm, Amplitude, Azimuth, Pocket, and Hanging Compasses—Day Telescopes for sea or land—Night and Day Telescopes—Night Telescopes, either to invert the object or show it erect—Cases of Instruments for Navigation and Drawing in general—Scales and Dividers—Common and Sliding Gunter's Scales—Mast maker's, Ship-carpenter's, and Cordage Rules—Marine and Common Thermometers—Log and Time Glasses—Bar and Compound Magnets—Jack and Pen-knives of various kinds—Writing and Letter Paper—Ink and Ink-powder—*Lead* and *Slate Pencils*—Log and Account Books—Seamen's Journals—with every article in the Stationery line useful at sea.

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☞ Compasses, Sextants, Quadrants, Thermometers, Barometers, and Spy-Glasses, correctly repaired; and orders left will be punctually attended to by sending for the article, and when repaired, carefully returned.

Cash given for correct second-hand Instruments.

REMARKS BY THE PUBLISHER.

The NAUTICAL ALMANAC, till the death of the celebrated Maskelyne, Astronomer Royal, was the most correct work published in England, and it was used by the Navigator with confidence and safety. From that time, errors, dangerous to lives and property, crept into the work; and the Almanac for 1820 came out so incorrect, that after the American edition was corrected and published, the first English edition was suppressed, and a new one, with the corrections made in the American copy, republished in London. The English copies for the years 1822, 1823, 1824, and 1825, have continued so erroneous as to call the attention of the House of Commons, and from one of its senators, who was fully competent to judge of its value, the animadversion, "that it was reduced so low in the estimation of the world, it was become a *by-word* amongst the literati of Europe."

At a great expense, the publisher of the American edition has availed himself of the labours of one of the most scientific characters in this country, who still continues to examine and correct, previous to the work going to press; and from the great attention paid to the proof-sheets, perfect copies are produced

In the English edition for the year 1826, which has been carefully examined and corrected, we find an errata inserted to the English copy for 1825, which are corrected in our edition; and also have a copy of another American edition for 1825 before us, in which *all the errors of the English copy are introduced, and others added.* In one page we discover TEN ERRORS, making a difference of 10 and 30 miles in longitude. This edition (for 1825) also contains an errata to the edition, published by the same person, for 1824, pointing out thirteen errors, which are forty-seven less than it contains. The subscriber, aware advantage might be taken of his corrections, secured them by copy-right, which prevents any other publisher of the Almanac, in this country, inserting them in other editions, and he with confidence can say, (and has the copies ready for inspection) there is no correct edition of the Nautical Almanac for the years 1824 and 1825, except those published by him.

E. C. WARD, Teacher of Navigation, Nautical Astronomy, &c U. S. Navy, and author of the invaluable Lunar Tables, makes the following remark on the Nautical Almanac, in his Rule to calculate the Longitude by Lunar Observations—"The Nautical Almanac here alluded to is examined and corrected by Mr. Daniel Stansbury, published by Edm. M. Blunt, and sold by Wm Hooker 202 Water-street, and E. & G. W Blunt, 147 Fly Market, New-York; it is, without exception, the most correct impression of this valuable work extant." In the Almanac for 1825 is a convenient practical rule for computing the latitude at sea, from the altitudes of two fixed stars observed at the same time, omitted entirely in the incorrect American edition alluded to.—Respectfully, the public's obedient servant,

July, 1824 EDM. M. BLUNT

COLLYER & HARRIS,

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OVAL HAT MANUFACTORY,

No. 155

Water-street, New-York.

July, 1824.

Furniture Ware-house and General Commission Store, No. 153 Maiden-Lane,

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JOHN SNIFFEN, offers for sale, a handsome and extensive assortment of

FURNITURE,

At the lowest prices, for cash or approved paper. Orders from Shipping and Country Merchants, executed without delay. July, 1824.

To Shipmasters, &c.

WILLIAM PAXSON HALLETT,

Attorney and Counsellor at Law, Commissioner and Notary Public,

No. 15 Burling-slip, New-York,

Respectfully informs the shipmasters, &c. of the port of New-York, that he has obtained from masters of ships, and otherwise, a list, containing the names of the seamen in New-York, together with a particular description of their persons, residence, character, &c. Also, the names of the ships or vessels in which they last sailed; and he intends, in future, to keep a complete register of the same; by the aid of which, he hopes to be able, at all times, to ship crews of unquestionable character in point of seamenship, if required.

Reference to Isaac Wright & Son, Francis Thompson, G. G. & S. Howland, Nathaniel G. Minturn & Co. and Jer. Thompson, Merchants; Isaac Waite, George Maxwell, Seth G. Macy, James Rogers, William Bowne, Levi Joy, Peter Price, William Thomson, John Stanton, Shipmasters.

[REMARK. The above promises great advantages to the commercial city of New-York, where the merchant and navigator are too often imposed on by bad seamen, and it is entitled to the patronage of the public. We wish the professional gentleman every success. July, 1824.

JAMES R. HARNED,

Wholesale and Retail

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No. 107

Pearl-street, corner of William-street,

NEW-YORK.

☞ SHIP STORES put up at the shortest notice.

July, 1824.

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